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REPORT

OF THE

COMMISSIONER OF PATENTS,

FOR THE YEAR 1849.

PART II.

AGRICULTURE.

Contents.

WASHINGTON:
OFFICE OF PRINTERS TO HOUSE OF REPS.
1850.

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REPORT

OF THE

COMMISSIONER OF PATENTS.

PATENT OFFICE, WASHINGTON, 20th *April*, 1850.

To the Hon. HOWELL COBB,

Speaker of the House of Representatives.

SIR:—PART II. of the Report of this Bureau for 1849 is herewith respectfully submitted.

It is devoted exclusively to the great and growing interests of Agriculture; and is accompanied with further researches by Professor Beck on the breadstuffs of the United States; besides general remarks on the adaptation of soil to the culture of the cereals, value of American breadstuffs, nutritious properties of various kinds of food, &c. Prof. B. gives the results of analyses of wheat and of wheaten flour from New York, New Jersey, Pennsylvania, Maryland, Virginia, Ohio, Michigan, Illinois, Missouri, and Wisconsin; of wheat and flour shipped for exportation from various ports of the Union, and of the same substance, the growth of Canada, Chili, France, and Spain.

With the view of adding to the general interest and to the popular value of this portion of the annual *exposé*, the Secretary of the Interior directed that the task of collating and arranging the materials for it should be committed to a practical and scientific agriculturist. This has accordingly been done, and in the following pages will be found the result.

I have the honor to be,

Most respectfully,

Your obedient servant,

THOMAS EWBANK.

SIR:—Agreeably to your request, I have prepared, and have the honor herewith to submit, some remarks on the Statistics and Progress of Agriculture in the United States for the year 1849.

The communications received in answer to the Circulars issued from the Patent Office in the usual form, number some four hundred. Not a few of these are extended essays, and all contain useful facts or suggestions, which have been gratuitously furnished by the contributors. To publish the whole would require two large volumes in place of one of moderate size; and to reject three-fourths of the matter in hand seemed a poor return to the many gentlemen, in almost every State, who have kindly proffered their services to promote the most important interest of the Republic.

Under these circumstances, it was thought not amiss to rewrite and greatly condense three-fourths of the letters and essays intended for the Report. This labor has been great, and has not been performed without assistance; but it has saved some ten thousand dollars in printing, and, it is hoped, with improvement to the document, and without doing injustice to any correspondent.

The undersigned deems it not out of place to offer a few suggestions in reference to the ways and means now available for the improvement of American Agriculture.

Agricultural Education.

Since 1823, when Judge Buel introduced the first bill to establish an Agricultural College in the State of New York by legislative aid, constant efforts have been made to render the study of rural economy as a *science*, not less than its practice as an *art*, popular in this country. Twenty seven years have now elapsed—a whole generation has passed off the stage—and New York, with her five hundred thousand cultivators of the soil, is still without the first agricultural school worthy of the name; nor is any other State in a better condition. Dark as this view of agricultural education really is, it is the darkness that precedes the dawn of a bright and happy day. Men who have labored for the improvement of Agriculture, and the elevation of Agriculturists, for a quarter of a century, with little of hope and less of pecuniary reward, now realize the beginning of an auspicious change in public sentiment. Thanks to agricultural journals and societies, the people will soon discover that labor and capital, devoted to tillage and husbandry, are as worthy of legislative consideration as labor and capital employed in mining, commerce, and manufactures. So soon as this truth shall be fairly comprehended, the long struggle of the friends of improvement will be crowned with success, and the victory won over both ignorance and its traditions.

It is indeed wonderful how long those enlightened, reasoning farmers, who, like Washington, cherish a due respect for their high calling, have had

to beg and beg in vain of State Legislatures, and of Congress, for a little assistance to prevent the universal impoverishment of American soils. Whatever has been done to arrest the exhaustion of arated lands has been effected not only without due aid from Government, but in spite of a mistaken policy, which encourages the removal of all the elements of bread and meat from cultivated fields, and their speedy transportation beyond the possibility of restitution. Neither the earnest recommendation of the illustrious farmer of Mt. Vernon, nor the prayers of two generations of agriculturists, nor the painful fact that nearly all tilled lands were becoming less and less productive, could induce any Legislature to foster the study of agriculture as a science. Happily, this term, when used in connection with rural affairs, is no longer the subject of ridicule. Some pains have been taken, in this Report, to prove that one thousand millions of dollars, judiciously expended, will hardly restore the one hundred million acres of partially exhausted lands in the Union to that richness of mould, and strength of fertility for permanent cropping, which they possessed in their primitive state.

The continued fruitfulness of the earth is an interest far greater and more enduring than any form of government.

If the twenty-two millions of people now in the United States may rightfully consume the natural fertility of one-third of the arable lands of the country, the forty-four millions who will be here twenty-five years hence may properly extinguish the productiveness of the remaining two-thirds of all American territory.

A great principle is involved in the science of agriculture, which reaches through indefinite generations, and forms the basis of all possible improvements, and of the highest hopes of our race. All advancement is impracticable in a country that closely approximates the condition of a desert. As a nation of farmers, is it not time that we inquire by what *means*, and on what *terms*, the fruitfulness of the earth, and the health and vigor of its invaluable products, may be forever maintained, if not forever improved?

These are questions of universal concernment, to the careful and rigid investigation of which no man should refuse to lend a listening ear. A governmental policy which results in impoverishing the natural fertility of land, no matter by what popular name it is called, must have an end. It is only a question of *time* when this truly spendthrift course, this abuse of the goodness of Providence, shall meet its inevitable punishment. To show the necessity of reform, a plain estimate has been made, in the chapter on "Agricultural Statistics," to prove that we annually waste enough of the elements of bread, without which not the first kernel of corn can be formed, to produce one thousand million bushels of this important staple.

The Board of Agriculture of the State of Ohio estimates the crop of corn in 1849, within the limits of that State, at seventy million bushels; and it will hardly be extravagant to say that the farmers of Ohio, Indiana, Michigan, Illinois, and Wisconsin export a million tons of breadstuffs and provi-

sions where they import one ton of the atoms drawn from their virgin soils, to form agricultural products. Can it be said, in truth, that a million tons of bread and meat are produced from *nothing?* Will it be contended that the earth within the reach of good ploughing contains an unlimited amount of the precise things consumed to make the plants, whose organic and inorganic elements are taken from the soil and never restored? If this be true, then all fertilizers are not only unnecessary, but absolutely worthless. This cannot be so, for lands that, seventy years ago, produced from twenty-five to thirty-five bushels of wheat in the State of New York, now yield only from six to nine bushels per acre; and in all the old planting States, the results of exhaustion are still more extensive and still more disastrous.

A lack of mental culture and discipline is the most serious impediment to the diffusion of agricultural science among the mass of farmers. Its language is to them an unknown tongue. Hence the most sublime truths in the economy of nature are shut out from the popular understanding. It is feared that this will ever be the case until schools, designed to teach those branches of learning which the practical farmer greatly needs, but does not possess, are established and maintained throughout the United States. So long as we refuse to plant the seed, it is folly to expect a rich harvest of knowledge.

We over-estimate the value of mere physical strength, like that of the ox or mule, and under-estimate the intrinsic worth of cultivated, well-developed reason, in practical agriculture. No inconsiderable degree of mental culture must precede all scientific tillage and husbandry. An oak is not matured from an acorn in a day, nor in a year; nor is it possible to form, in a single generation, a universally educated and highly improved race of men. Such improvements, to be general and fixed in a people, as a distinguishing feature in their character, must be deeply impressed on several successive generations.

As a class, farmers have few advantages for being well informed in the rapid progress now making in the economical improvement of soils, cultivated plants, and domestic animals. This lack of opportunity is a serious misfortune, and leads to this practical result: With five million farm laborers—two million seven hundred thousand in the slave-holding, and two million three hundred thousand in the free States—American agriculturists so misdirect this immense power of production, that the injury done to one hundred million acres of land is nearly equal to all the apparent net profits on the whole rural industry of the country.

To illustrate an important fact as well as principle, let us suppose a farmer produces crops worth one thousand dollars, and they cost him, including all expenses for labor, wear of implements, interest on capital, &c., eight hundred and fifty dollars. Nominally, he has a profit of one hundred and fifty dollars. But it often happens that, if he should undertake to replace in his cultivated fields as much of potash, soda, magnesia, phosphorus, soluble silica

and other elements of crops, as both tillage and cropping had removed, it would cost him one hundred and seventy-five or two hundred dollars to effect that purpose. It is only by *consuming the natural fertility of the land* that he has realized any profit.

In a national point of view, all labor that impoverishes the soil is worse than thrown away. No fact in the science of political economy is more important than this. To reduce a field, which in its virgin state produced forty bushels of corn per acre, down to twenty, in ten years, and then cultivate it forty years and harvest only twenty bushels per acre, in place of forty, is equal to a loss of four hundred bushels of corn per acre, or one-half the diminished product, without any equivalent whatever. Thus to impoverish land is to wither the muscles of both man and beast employed in its tillage.

Human toil is often praised for being highly *productive*, when, had the whole truth been known, it would have been seen to be remarkably *destructive.*—Labor never creates a particle of new matter by ploughing deep or shallow: but it frequently places the elements of grain, cotton, and provisions beyond the reach of all scientific farmers who may live hereafter and find the soil wanting in the raw material for making human food and raiment. There appears to be no government that realizes its duty "to promote the public welfare" by widely diffusing among its citizens a knowledge of the true principles of tillage, and by impressing upon them the obligation which every cultivator of the soil owes to posterity, not to leave the earth in a less fruitful condition than he found it.

The Ravages of Insects.

Such insects as Hessian and wheat flies, curculios, weevils, army and boll worms, annually destroy crops to the amount of twenty millions of dollars. If a pirate on the high seas, or an Indian savage on land, injures the property of a citizen to the amount of a few dollars, millions are expended, if need be, to punish the offender. This is right. But when public enemies of a different name do a thousand times more injury to a whole country, are its citizens under any necessary restraint which forbids their making a common effort to protect their property from insect devastators? Parasitic plants, such as rust on wheat and many fungi, as well as injurious insects, are on the increase. To attempt to explain the reasons *why* this is so, would lead at once into questions in animal and vegetable physiology, out of place in this brief synopsis of such rural topics as are believed to be of general interest.

It may not be amiss to remark, however, that many boys are apparently educated to kill all small birds that subsist mostly on insects, so soon as these youngsters are large enough to shoulder a gun.

Government can do much to check the ravages of insects by collecting and diffusing useful information as to their habits, times of transformation,

and the best means of destroying or avoiding them. If farmers fold their arms and say that nothing can be done, by the science of entomology, or by any other means, what but an increase of the evil is to be expected? Not to *try* to escape the infliction is treating one's enemies with unmanly forbearance, and evinces a belief in fatalism worthy of a disciple of Mohammed.

Analysis of Soils, Marls, and Fertilizers.

Something should be done in reference to the analysis of soils, fertilizers, marls, and other minerals constantly sent to the Patent Office for that purpose. For many years, chemists and philosophers have been investigating the affinities and other peculiarities of "molecules" or ultimate indivisible particles of matter. These scientific researches have revealed many important truths and natural laws, which have a direct bearing on all the economical purposes of agriculture. Some pains should be taken to impart a knowledge of these laws to all practical farmers. When we consider how little opportunity the mass of agriculturists have to study the chemical composition of their soils and crops, it can readily be seen that information of this kind is greatly needed in all operations which aim to feed cultivated plants with their appropriate aliment.

Professor Henry, the distinguished Secretary of the Smithsonian Institution, has authorized me to say that the extensive chemical apparatus and excellent laboratory of the Institution will be at the service of any reputable chemist, to make investigations for the increase and diffusion of knowledge in this branch of science.

I have compiled for this Report about one hundred analyses, embracing most of the cereals, several grasses, clovers, legumes, roots, cotton, tobacco, flax, and the ash of fruit and forest trees, from the latest European and American authorities. These analyses will be found valuable for reference.

An elaborate paper on the "Study of Soils," giving the chemical composition of their parent rocks, the amount of the elements of crops in a cubic foot of earth, available as food for plants, together with researches into the annual production and consumption of mould, the variation of the temperature and hygrometric properties of soils, has been deferred to keep this document within a moderate size. For a similar reason, no space has been allowed for mere *guesses* at the quantity of grain and other crops grown in the year 1849.

The Preservation of Provisions.

The science of preserving meat, lard, butter, cheese, and other animal as well as vegetable substances, used as food for man, has received very little attention in this country. This neglect causes a loss of many millions every year. To say nothing of the bad taste of eating so much frowy and rancid butter at home, full one-half of all that is sent to England and other foreign countries is sold at half the price of sweet butter, by reason

of the defective manner in which it is manufactured and put up for market. American farmers have great advantages for the economical production of beef and pork, mutton and wool, and it will render them a valuable service to obtain from Europe correct information of all discoveries and improvements, either in the growing and feeding of domestic animals, or in the curing of provisions.

Few are aware how susceptible of improvement is the living machinery which elaborates *milk* for nearly every family in the Union. There is a reliable account, in this Report, of a dairy of forty-one cows, kept in the State of New York, which yields sixty-two dollars in butter, cheese, and milk, as the product of each cow a year. From the returns of the last State census, it is safe to say that one million one hundred thousand cows are now milked in that State, which are supposed to yield about twenty dollars per head. To improve these up to an average annual product of thirty-one dollars each (that is, to one-half what the best large dairies in the country now yield) would add twelve million one hundred thousand dollars to the income of the citizens of a single State. This gain, by the improvement of one kind of rural machinery, would be equivalent to creating a capital of two hundred millions of dollars, and placing the money where it would yield over six per cent. interest in perpetuity.

If all the sheep in the United States gave as good returns in wool for the food consumed, as the best one hundred thousand now do, it would add at least sixty million pounds to the annual clip of this important staple.

In one of his letters to Sir John Sinclair, General Washington says, in substance, that, at the time he entered the public service in the War of the Revolution, his flock (about one thousand) clipped five pounds of wool per fleece. Seven years after, when he returned to his estate, his flock had so degenerated that it gave an average of only two and a half pounds per head, which was the common yield of Virginia sheep then as it is now.

Although the numerous importations of superior sheep, cattle, horses, and swine have greatly benefited the country, it must be admitted that much has been lost by suffering improved animals to deteriorate. Every wool grower should ponder well this fact. If two and a half pounds of wool will pay the whole cost of keeping a sheep a year, five pounds will pay one hundred per cent. profit on that cost. Washington was eminently a "book-farmer," and was anxious to gain knowledge from the educated agriculturists of Europe and of his own country. His overseer believed in keeping sheep as his father did, and was opposed to all innovations in husbandry.

There are now not far from six million horses and mules in the United States: and it is not too much to say that in a few generations these animals may be improved full $30 a head on an average. If so, then the gain by this increase of muscular power, and its greater durability, will be one hundred and eighty million dollars. If we study critically the machinery for converting grass, roots, and grain into beef and pork, the difference is

found to be still more striking. Let the *facts* relating to this subject be spread before the people, and great improvements will soon follow; and all classes will share equally in the profits of more productive labor.

The distribution of Seeds and Cuttings.

It is a law of nature, now fully recognized by men of science, that all cultivated plants and fruits, as well as all animals, are subject to constitutional deterioration, and are susceptible of organic improvement. Hence one thousand seeds of one variety of wheat, corn, cotton, or tobacco will produce a larger return, under equal advantages of climate, soil, and culture, than a like number of seeds of another variety.

Plants propagated by buds, like sugar-cane, potatoes, and fruit-trees, are peculiarly liable to constitutional weakness, and are less able than seedlings to endure rude treatment in violation of the laws of vegetable life. On many plantations the vital force of the sugar-cane is nearly exhausted: and this office is strongly urged to procure from countries where the plant is indigenous and grows from the seed, a new stock both of seeds and rattoons for the use of planters. In cultivating this tropical plant in districts bounding its zone on the north, much care and some science will be found highly useful.

Both seeds and cuttings of the best figs and olives grown on the coast of the Mediterranean should be procured through American consuls resident at the different cities on the borders of that sea. Figs and grapes, "oil and wine," will some day be numbered among the staples of the Southern States.

There is reason to believe that the most improved varieties of wheat grown in England and France would be a valuable acquisition to this country; and our wheat-growers would esteem it an especial favor if only a few bushels were procured for general distribution. With the small sum appropriated for the purpose, about eighty thousand packages of seeds have been put up and distributed, within the last three months. With a better organization and greater facilities for collecting seeds and cuttings, vastly more good might be done. There are now some two hundred thousand copies of agricultural papers and periodicals printed, which circulate more or less in every State in the Union. These are doing an invaluable service to the country. They cannot, however, enact laws for collecting annually reliable statistics of the results of labor and capital employed in Agriculture. Truthful statistics form the groundwork of all reforms — of all progress. State legislatures must aid in this great work. If "knowledge is power," ignorance is *weakness;* and the removal of this weakness is one of the highest duties of every republican government. Either the assessors or collectors of State and county taxes should be provided with blanks to collect useful information as well as money, from the people.

How Cities exhaust the fertility of Land.

There has been enough of the elements of bread and meat, wool and cotton, drawn from the surface of the earth, sent to London, and buried in the ground or washed into the Thames, to feed and clothe the entire population of the world for a century, under a wise system of agriculture and horticulture. Down to this day, great cities have ever been the worst desolaters of the earth. It is for this that they have been so frequently buried many feet beneath the rubbish of their idols of brick, stone, and mortar, to be exhumed in after ages by some antiquarian Layard. Their inhabitants violated the laws of nature which govern the health of man, and secure the enduring productiveness of the soil. How few comprehend the fact that it is only the elements of bread and meat evolved during the decomposition of some vegetable or animal substance that poison the air taken into human lungs, and the water that enters the human system in daily food and drink! These generate pestilence and bring millions prematurely to their graves!

Why should the precious atoms of potash which organized the starch in all the flour, meal, and potatoes consumed in the cities of the United States in the year 1850, be lost forever to the world? Can a man create a new atom of potash, or of phosphorus, when the supply fails in the soil, as fail it must under our present system of farm economy? Many a broad desert in Eastern Asia once gladdened the husbandman with golden harvests. While America is the only country on the globe where every human being has enough to eat, and millions are coming here for bread, how long shall we continue to impoverish ninety-nine acres in a hundred of all that we cultivate?

Both pestilence and famine are the offsprings of ignorance. Rural science is not a mere plaything for the amusement of grown up children. It is a new revelation of the wisdom and goodness of Providence—a humanizing power, which is destined to elevate man an immeasurable distance above his present condition. To achieve this result, the light of science must not be confined to colleges; it must enter and illuminate the dwelling of every farmer and mechanic. The knowledge of the few, no matter how profound or how brilliant, can never compensate for the loss incurred by neglecting to develop the intellects of the many. No government should be wanting in sympathy with the people, whether the object be the prevention of disease, the improvement of land, or the education of the masses. One per cent. of the money now annually lost by reason of popular ignorance will suffice to remove that ignorance.

I have the honor to be,
Very respectfully,
Your obedient servant,
DANIEL LEE.

Hon. Thomas Ewbank,
Commissioner of Patents.

I.

AGRICULTURAL STATISTICS.

The value of agricultural statistics depends on their general accuracy and being reliable for all business purposes. Wrong information as to the quantity of grain, tobacco, and other crops, annually grown, and mis-statements in reference to their market value, are calculated to mislead the unwary—tempting thousands to invest and sink their capital in uncalled-for and disastrous operations.

In the absence of a regular census, there is no way to determine, with any approach to accuracy, the amount of grain and provisions annually produced; and it is thought better to make no estimates at all, so far as the official returns are defective, than to fabricate statistics by mere guessing. The injury that results from this is not confined to the farming interest, but all dealers in and consumers of agricultural products are equally liable to sustain pecuniary loss by the public credit given to erroneous statements emanating from a department of the government. Whoever attempts to furnish statistics should bear in mind that, in the same degree in which *true* information is valuable, *false* information is injurious to the community. Certainly the great farming interest of the country has a right to exemption from harm, if government can do it no good.

The wheat crop of Michigan has been estimated at ten million bushels. The census of that State for 1849 gives the amount at four million seven hundred and thirty-nine thousand two hundred and ninety-nine bushels, showing an over-estimate of more than one hundred per cent. Instead of placing the value of the estimated ten million bushels at something like the worth of this crop to the producer, every bushel is set down at one dollar and fifteen cents, giving an aggregate of eleven million five hundred thousand dollars. Seventy cents are quite as much as the farmers of Michigan realized for their wheat in 1848; and, by correcting both the quantity and price, the figures are reduced to three million three hundred and seventeen thousand five hundred and nine dollars, or to nearly one-fourth of the sum said to have been obtained.

Hitherto no very definite objects appear to have been sought in collecting statistical information pertaining to rural affairs. In consequence of this lack of purpose, the means employed have been inadequate, except to accumulate a mass of figures for the truth of whose statements no one was responsible. Statistics, to be worthy of the name, must be founded on facts entitled to confidence. What evidence is there on which one may presume to name the tons of hay or bushels of grain grown in the State of New York in the year 1849? There is none whatever, nor has there been any since the State census of 1845. Why, then, waste time and paper in writing and printing crude guesses, in an official document, to mislead the public? Instead of repeating an operation which is believed to be worse than useless, a humble attempt will be made in this chapter to point out a few defects in the agricultural statistics of the country, and suggest such improvements as are most desirable and practicable.

If the question were asked, of what crop grown in the United States do

the people export the largest amount in value, the answer would be, cotton; for it pays for nearly two-thirds of all the imports of the country. If an American statesman, merchant, or farmer were to ask, how many acres are planted in this crop, the answer must be: I cannot say, for in no cotton-growing State has a census ever been taken, either by the Federal Government or by its legislature, which gave the number of acres devoted to this staple.

Here is a most extraordinary omission, and one which has largely contributed to the unwise exhaustion of millions of acres of the best cotton lands in the world.

If the question were asked, how many acres are planted in tobacco? nobody can tell; for neither Congress nor any State government has deemed the matter of sufficient importance to ascertain the fact. No United States census has ever given information as to the number of acres sown in wheat, rye, barley, oats, hemp, flax, or peas, or planted in corn, potatoes, beans, or any other hoed crop.

If the questions were asked, how many sheep were shorn in 1840 to yield the thirty-five million eight hundred and two thousand one hundred and fourteen pounds of wool, and how many lambs were *not* counted as "sheep" in the nineteen million three hundred and eleven thousand three hundred and seventy-four enumerated, no one can answer. The fleeces clipped have never been counted; nor has any census given the number of cows milked in the United States. So far as reliable statistics are concerned, all our farming operations are conducted in midnight darkness. Nothing is so much needed as the annual record of trustworthy facts, extending over all the States, setting forth the productive power and value of both land and labor, when employed to the best advantage. So soon as this shall be done, whether by State Legislatures or Congress, it will be seen that the labor and soil of one farmer give twice as good returns for the benefit of himself and the community at large, as do the labor and soil of another, although the land of both may be alike productive. The returns procured through the medium of a few plain, simple questions, put by the assessors or collectors of taxes, would demonstrate the truth of the above remark; and, when demonstrated, those who fail to use their means to the best advantage will discover their errors and immediately change for the better.

So soon as legislatures shall be willing to promote improvements in tillage and husbandry, nothing is easier than to effect the desired object. Bring the practical results of the art, the science, and the energy devoted to agriculture often before the public, and the influence of thousands of good examples will tell powerfully in favor of universal advancement. Good and bad farming are now so blended that delinquents escape nearly all exposure; while such as do well are denied that distinction which is the just reward of merit. There is no resisting a legitimate argument, sustained by conceded facts. Mistakes in practice and errors in theory must give way before the light of truth; and *the truth alone* should be diligently sought, and widely disseminated among the farmers of the Republic.

When we shall be permitted to know the exact difference in the organic structure and productive value of the machinery which transforms grass, grain, roots, and other vegetable food into milk, meat, wool, and horseflesh, it will be seen that some domestic animals yield a profit ten times larger than others. There are samples of wool in the Patent Office, the product of a sheep that yields 18 lbs. of washed wool a year and weighs 420 lbs. This

mammoth sheep is the property of Colonel Josiah W. Ware, of Clarke county, Virginia, whose best fat wethers sell at thirty-five dollars a head.

In no branch of husbandry can greater or more profitable improvements be made than in wool-growing. Instead of importing so many millions of pounds of wool, in broadcloth, flannel, and raw material, American farmers should supply the home demand, and have a large surplus for export. It is much to be regretted that the census of 1850 will give no information as to the number of fleeces clipped in the United States. Without this knowledge it will be impossible to know what county or district gives the most wool per fleece.

The statistics of the dairy business are more defective than those pertaining to sheep-husbandry. The counting of cows in all the States is the first step toward their universal improvement; but this is yet to be taken. Previous to 1845, the number milked in the State of New York was not known; and it required some effort to persuade its legislature to have them counted. In that year, the number was nine hundred and ninety nine thousand, four hundred and ninety. This number (so near a million) attracted public attention to the production of butter and cheese, and the improvement of milch kine, in a remarkable degree.

To the New York State Agricultural Society, and especially to its indefatigable secretary, B. P. Johnson, Esq., great credit is due for successful efforts to advance this important interest. It is thought by those best informed on the subject that one million one hundred thousand cows in that State now yield an average return of twenty dollars a head. One of its best dairymen expresses the opinion, in the Transactions of the State Society for 1849, that the dairy products of that commonwealth will reach, at no distant day, fifty million dollars per annum. The business is rapidly extending in northern Ohio, and more or less as far south as Georgia. Excellent cheese, from two dairies in that State, were exhibited at the well attended State Fair held at Stone Mountain, in August, 1849. About sixty cows are milked in one of these dairies, and not far from one hundred in the other. Both are profitable, new cheese selling at from ten to fifteen cents a pound. The annual consumption of cheese at the South is increasing, and we know nothing that should prevent the farmers of Tennessee and other States in that quarter of the Union from producing enough for home consumption, if they make none to export. There are dairies in the State of New York which turn out six hundred pounds of good cheese per cow in a year; but from three hundred to four hundred pounds is a more common yield.

Intimately connected with the economical production of butter and cheese, is the art of making cheap *pork* for family use. For rearing pigs, buttermilk and whey are admirably adapted; but where hogs are to be grown in a large way, a different system is practiced. Clover, peas, and oats, fed off in the field by hogs, produce meat at a cheaper rate than it can be made on corn alone. According to the results attained by Mr. Ellsworth, late Commissioner of Patents, three and a half pounds of corn will form a pound of good pork; although most farmers give five pounds of corn for one of pork. Our statistics relating to the production of meat, whether beef, pork, veal, or mutton, are meagre and extremely defective. Very little science has been brought to the aid of American farmers either in the production or curing of provisions of any sort. In shipping perishable commodities of this kind to distant markets, and particularly to England, agriculturists in this country labor under many disadvantages. Much of the salt sold in

the United States is too impure to save meat, butter, and cheese well. From this defect alone, immense losses are sustained.

To compete with Englishmen in feeding people at their own doors, while Americans have to transport their breadstuffs and provisions from three to four thousand miles to reach the consumer, is obviously a hard business for our farmers. In the operation, their cultivated fields lose all that is exported, and receive nothing whatever in return. But independently of this, probably more than half the butter sent to England from this country is sold as *grease*, and at half the market price of a good article. This injures the reputation of all American butter, and diminishes the demand for it abroad. Equal complaint is made of the bad methods in which we cure and handle bacon for English consumption. Our export of pickled pork, bacon, lard, and live hogs, during the year ending June 30th, 1849, was nine millions two hundred and forty-five thousand eight hundred and eighty-five dollars. After making due allowance for every disadvantage, it is believed to be better farm economy to convert corn into pork and lard to send abroad, than to export the grain or meal. By thus saving all the manure which the corn will make, the expense of growing this crop, and consequently the cost of the pork and lard, may be reduced from twenty-five to fifty per cent. Ripe dry corn should be boiled, especially if it is not ground, before it is fed to swine, cattle, or sheep. And it will more than pay the expense to boil corn fed to working mules, horses, or oxen.

The statistics of the raw materials consumed and wasted in the production of every crop, and in the food of every animal kept on the farm, deserve to be studied with peculiar care. Few appreciate the immense loss sustained by first impoverishing arable lands, and then cultivating them in wheat, cotton, corn, grass, and other crops, with a poor return for the labor bestowed. In a national point of view, it is susceptible of demonstration that all labor which impairs the natural productiveness of the earth is worse than thrown away, no matter what the price paid for the products of such labor. We should ever bear in mind that the continued fruitfulness of the soil is above all price.

It may not be amiss to inquire what amount of the elements of bread and meat, cotton, tobacco, and other crops, is annually extracted from the surface of the earth in this country, and never restored to the fields whence it was taken. In answer to circulars issued from the Patent Office, several gentlemen at the South have stated that, to supply slaves on plantations with bread, including old and young, requires from twelve to thirteen bushels of corn each a year. Taking thirteen bushels as the average consumption, of the twenty-two millions of people in the United States, of breadstuffs, and the aggregate is two hundred and eighty-six million bushels per annum.

Without deeming it necessary to go into an explanation to prove why it is so, the fact may safely be assumed that the elements of fertility contained in all the meat, milk, butter, cheese, potatoes, fruit, and garden vegetables consumed by the American people, exceed by ten per cent. the amount which exists in the grain consumed. It is sufficient for my purpose, however, to place the estimate below ten per cent., and call the fertilizing elements contained in these articles of human food equal to three hundred and fourteen million bushels of corn. By adding together the sums above named, we have six hundred million bushels of corn, in effect taken from American soils, of which next to none is ever returned in night-soil or liquid manure.

The most intelligent wool-growers estimate the number of sheep now in the United States at thirty millions. In 1840, the number of swine was twenty-six millions three hundred and one thousand two hundred and ninety-three. At the usual rate of increase, their present number is not far from thirty-five millions. The number of neat cattle in 1840 was fourteen millions nine hundred and seventy-one thousand five hundred and eighty-six. Their present number should be about nineteen millions. At the last census, the number of horses and mules was four millions three hundred and thirty-five thousand six hundred and sixty-nine. Their present number approaches six millions. By estimating all the poultry as equal to ten millions of sheep (a low estimate), there are now in the United States one hundred millions of domestic animals, not to count goats and dogs, of which there are some millions. That these domestic animals draw their subsistence from the soil is plain enough; but to say what part of the elements of the food consumed is never restored to any improved land, is impossible. It is below the truth, in the judgment of the writer, to say that one-third of all the manure voided by the horses, mules, cattle, sheep, and swine in the United States is wasted. If so, the annual loss is more than equal to the production of two bushels of corn to each animal; or the aggregate exceeds two hundred million bushels.

We have now to estimate the annual loss incident to the production of the great staples of cotton, tobacco, sugar-cane, hemp, and flax, not to name smaller crops. Not far from ten millions of acres are annually planted in cotton, cane, tobacco, and hemp. It is a serious misfortune that the census of 1850 will throw no light whatever on either of these crops, so far as the area planted is concerned. Judging from our knowledge of the subject, we should prefer to have a field produce twenty bushels of corn per acre, and part with all the grain, retaining the stalks, blades, cobs, weeds, and grass, to renovate the land, to having it cultivated in cotton, tobacco, or hemp, in the usual way of growing these crops. The damage done to the ten millions of acres devoted to the culture of these staples is equal to the growth and exportation of two hundred million bushels of corn a year. While we have said nothing of the breadstuffs and provisions actually sent out of the country, and have conceded that two-thirds of all the liquid and solid excretions of all domestic animals are saved and turned to a profitable account—a statement which few farmers familiar with the husbandry of many States will endorse—yet the aggregate loss is equal to the production of one thousand million bushels of corn, or of half that quantity of wheat.

It may be said that this prodigious annual waste of the raw material for making human food and raiment is a matter of no practical consequence; and that each cubic foot of soil contains an unlimited amount of the precise things which nature consumes in forming cotton, wheat, corn, tobacco, sugar-cane, and other cultivated plants. This is the popular opinion, and the practice of American agriculture is based on this mistaken theory. Those farmers who do most to impoverish their cultivated fields are the greatest *theorists* in the country. It is so much easier to adopt a ready-made theory, handed down from one's father and grandfather, than to study the several substances in a soil required to give a generous harvest, that ninety-nine in a hundred adopt the former course. How few agriculturists have any clear knowledge of the quantity of any essential element of wheat or corn available to the growing plant, which any given amount of his soil contains! The atoms that form the crop, whether in the earth, or in the atmosphere,

are rarely studied by practical farmers. Every cultivated plant contains an appreciable amount of potash and phosphorus—not to name other minerals drawn from the soil. Without some alkali and phosphoric acid, no one has ever succeeded in producing the seed of any cereal plant. Nor can a cotton, potatoe, or tobacco plant be grown to maturity without these soluble earthy salts, which appear as *ashes* when such plants are carefully burnt. If a farmer were to ask the price of phosphorus at any shop that deals in the article, he would find that it is worth from two to three dollars a pound. The phosphorus of commerce is mostly obtained from the bones of domestic animals.

The high market price of this substance proves its scarcity. There are few soils which contain, in an available form, so much as one part of phosphoric acid, or one of potash in a thousand; and yet, in the plenitude of our national folly, we annually throw away in our cities, villages, and on our farms, enough of potash and phosphorus to make five hundred million bushels of wheat, or twice that quantity of corn! Let the agriculturists who are troubled to raise good crops of wheat, remember that not far from eighty per cent. of the incombustible earthy matter consumed by nature in forming the seeds of this plant, are *potash* and *phosphoric acid*.

When will Congress or some State Legislature appropriate the small sum of one thousand dollars, needed to demonstrate in a practical way *the cost of making a new soil*, equal in potash, soda, magnesia, lime, chlorine, soluble silica, phosphorus, sulphur, nitrogen, and carbon, in the condition of mould, to a fair virgin earth, before the work of exhaustion begins?

Statistics of this kind would be invaluable to the whole country. Of course, the renovation of land can be effected much cheaper in some localities than in others; but the critical study of the subject, with reliable weights and measures, both of raw material consumed and product, at one place, would throw much light on one of the most important problems in the art and science of agriculture.

How much of the earthy elements of crops can an acre of tilled land part with every year, and not diminish in fertility? This is a question of fact, not one of theory; and who among the three millions of farmers in the United States can answer it?

So soon as the American people can be persuaded to study Agricultural Statistics as a science, the surplus of the elements of bread and meat, wool and cotton, which really exists in some soils, will be carefully husbanded, and applied in the most economical manner to such as lack in that regard. In this way, every acre having a climate congenial to the purpose can be made to yield a bale of cotton a year, or sixty bushels of corn, or twenty-five of wheat.

No department of husbandry is more interesting to the thoughtful farmer, or more promising of auspicious results, than the careful study of fertilizers. But we are sorry to say that no State in the Union has regarded statistics on this subject as worth the trouble of collecting. In several of the planting States, cotton seed is much used as a manure, and it is very desirable to know how many additional bushels of wheat or corn one thousand bushels of cotton seed ought to give the skillful agriculturist. We have reason to believe that one planter realizes twice the benefit from this exceedingly valuable fertilizer that is obtained by another. Similar remarks will apply to the manure derived from the consumption of one hundred or one thousand bushels of corn, where the whole matter voided is carefully preserved from loss.

The essential facts pertaining to the feeding both of plants and animals are permitted to remain in lamentable obscurity. Why should a farmer, who has a quantity of stable or yard manure to haul to a distant field, be compelled to carry out eighty-five loads of simple water in every one hundred of this valuable fertilizer? It is rare indeed that barnyard manure contains less than eighty per cent. of water, and it often has eighty-eight per cent. Is there no way to avoid this obvious loss of labor? As one hundred pounds of guano (the dung of sea-birds) frequently produce five hundred of corn, or three hundred of wheat, why may not similar elements of crops, in the excretions of all domestic animals, be alike concentrated, and drilled in with the seed, or scattered broadcast over the land? Why throw away more solid, hard work on one hundred million acres, than all the mechanics and manufacturers in the country perform, in an attempt as foolish as to carry freight in knapsacks, and travel on foot in competition with modern railroads? If one hundred pounds of the best guano is better to augment a crop of grain than a like weight of common loam, or stable manure, there must be a reason *why this is so*. What is this reason? We can only give a few hints; and in the first place, let the reader consider well the fact, that in one hundred pounds of wheat there are ninety-five of the elements of water, and charcoal, called carbon.

Now, wheat plants are not wholly dependent on the mould in the soil for carbon and the elements of water; and the farmer should take advantage of this fact. The other five parts in one hundred of wheat being organized nitrogen, and the incombustible part of the seed, are less abundant, in an available condition; and these lacking ingredients must be supplied by the husbandman. Of these elements guano really contains, when pure, and the dung of pigeons also contains, more than any other product of nature. Hence, when estimated in pounds, the dry excrements of birds are more valuable than those of cattle, or of man even, although the man, the ox, and the bird may each consume corn or wheat. There is reason to believe that when birds eat two hundred ounces of wheat, their excretions dried will weigh about the same as those of a man or pig formed by half that quantity of wheat, provided neither animal nor bird gains or loses in weight. The solid excretions of a horse, and, so far as is known, of all quadrupeds, by the bowels and kidneys, are about forty per cent. of the food consumed.

The other sixty parts in one hundred escape from the system mostly as carbonic acid and vapor given off in breathing. In birds, the weight of the matter which escapes through their lungs is some eighty per cent., and the guano about twenty per cent. If this estimate approximates the truth, then a pigeon must consume five hundred grains in weight of wheat or worms to form one hundred of dry dung; and, if nature is true to herself, the fertilizer derived from five hundred grains of wheat should reproduce the amount consumed. The essential truth in this matter is, that so much of the elements of animal food as escape into the atmosphere by respiration and insensible perspiration, may safely be dispensed with in feeding cultivated plants. The matter that escapes is mainly the elements of water and carbonic acid. Although organized carbon, oxygen, and hydrogen are far from being valueless as manure, they are not so indispensable to be artificially applied as ammonia and salts of potash, lime, and magnesia. Much the larger portion of the food of animals, taken into the stomach, is absorbed and passes into the blood-vessels.

If any one branch of farm statistics is more important than the others, it is that which relates to the skillful production and use of manure. Few

are aware how much labor and money are lost by popular ignorance on this subject. Boussingault fed a horse which neither gained nor lost weight, with twenty pounds of hay, six pounds of oats, and forty-two pounds of water a-day. In the food consumed, there were twenty-two pounds six ounces of perfectly dry matter. The dung and urine voided in twenty-four hours, when equally dried, weighed ten pounds three ounces, showing a loss by breathing and insensible perspiration of twelve pounds three ounces. In the hay and oats, there were ten pounds six ounces of carbon (charcoal); in the excrements, only three pounds eleven ounces seven pennyweights; being a loss of nearly seventy per cent.

In the food, there were eight pounds seven ounces two pennyweights of oxygen (vital air); in the excrements, only three pounds seven ounces sixteen pennyweights. The loss in weight of hydrogen (it existing in the food as one to eight of oxygen) was in about the same proportion. There were four ounces nine pennyweights of azote (nitrogen) in the food, of which three ounces fourteen pennyweights appeared in the dung and urine. Of earthy salts, there were one pound six ounces ten pennyweights in the hay and oats; in the excretions, one pound six ounces two pennyweights.

The critical study of the above data will show that one hundred pounds of hay and oats yield about forty pounds of dry manure. It is known that manure heats, ferments, rots, and loses weight. This chemical operation can be so conducted as to reduce the weight one half, without essentially or equally reducing its fertilizing power.

If a pound of ammonia, phosphates of potash, soda, lime, and magnesia, is worth as much in night-soil as in imported guano, then there is no need whatever of importing manure from Peru and Africa. We learn from dealers in the article, that some sixty thousand dollars are paid for Peruvian guano a year in the District of Columbia alone. Not only can this sum of money be saved, but guano equal to, and identical with the Peruvian, can be manufactured and sold in the city of Washington at half the price of the imported article, at a fair profit. There is not an element in guano which does not exist in bread and meat; and taking the market value of this dung of sea-birds as the standard (fifty dollars a ton), and the fertilizers annually wasted in this city (Washington) are worth one hundred and fifty thousand dollars. If Congress will give the agricultural department of the Patent Office five hundred dollars to test this matter in a practical way, the best method of preparing poudrette can be published in the next annual report from this office, and will be received with great satisfaction by the farmers of every State in the Union. It is no reflection on American agriculturists to say, that the science of preparing manures is little understood; for we have no agricultural schools in the country, and neither Congress nor any State Legislature has given a dollar to foster the scientific investigation of fertilizers.

Some may say that this subject has nothing to do with agricultural statistics, and that no facts but such as relate to the quantity and value of crops and other products of rural industry should be discussed under this head. But how is one to know the value of the hay and grain, grass and roots made and consumed on a farm, without regard to the meat, wool, butter, cheese, horses, mules, and *manure*, into which these crops are converted?

II.

A GENERAL VIEW OF AMERICAN AGRICULTURE.

CHAPTER I.

The Position of American Farmers.

EVERY one that eats bread or wears cloth made of wool, cotton, or flax, has a direct personal interest in the results of tillage and farm economy. Hunger and nakedness are wants of the most pressing character; and Providence has placed them alike in every human being. In civilized communities, all are equally dependent on successful agriculture for the means of subsistence. Let the soil be permanently exhausted, or fail but for a year to reward the labor of the husbandman, and no language can adequately describe the intensity of the universal suffering that must ensue. Hence this branch of national industry has peculiar and paramount claims to the earnest attention and the fostering care of all governments which are regardful of the public safety, and sustained by common sense.

American agriculture offers for consideration several interesting and striking features: prominent among these is the fact that nearly three-fourths of the labor and capital of the country are employed in this single pursuit. Agriculturists are themselves a large majority of the voters, tax-payers, and consumers of all domestic and foreign goods.

Under our republican system, they are mainly responsible for the good government of each State, and of the Union. If their public servants, whether in Congress or State Legislatures, fail to promote improvements in agriculture, as recommended by President Washington, the fault is not in their representatives, but in those who neglect to ask for such aid as Government may properly grant.

American farmers enjoy advantages superior to those of all other nations for improving both themselves as a class, and their landed estates, up to the highest capabilities of man, and of the earth which he cultivates. This Republic proffers to rural art and rural science more than one thousand millions of acres of available farming lands; of which as little, or as much may be subdued and improved as wisdom shall dictate. There is neither compulsion nor restraint in either direction. With this entire freedom of action is associated a degree of security for life, liberty, property, toleration of religion and exemption from onerous taxes, without a parallel in the history of the world. In extent of sea coast, facilities for river, lake, and canal navigation; in variety of climate, soil, vegetable and animal products; in indefinite and almost unlimited commercial, manufacturing, mineral, and hydraulic resources, no other country equals this. There is some danger, however, that we shall prove unworthy of so great blessings—that we may forget the source whence they come, abuse the peculiar advantages and exalted privileges which we possess, and blindly cling to the barbarous practice of impoverishing the soil, to the incalculable injury of coming generations.

Instead of exhausting millions of acres without any adequate recompense, instead of looking longingly toward the wilderness of forest and prairie at the west, we should search closely into the lands already under the plough, and learn what can be done to add two, three, and fourfold to their present productiveness. The time has at last arrived when it is indispensable to the continued prosperity of all the older States that the principles both of renovating and exhausting cultivated fields be thoroughly and universally understood.

A few Facts about Soils.

Soils contain, as a general thing, not more than one part in a thousand of the atoms, in an available condition which nature consumes in forming a crop of any kind. This statement expresses a fact of great practical importance; for the husbanding of these fertilizing atoms is the first step toward arresting the impoverishment of the earth. It is the matter in the soil which makes crops in one arrangement of its atoms, and forms manure in another condition of the same atoms, that the farmer should learn to preserve from waste and loss.

Soils of different degrees of productiveness, where their mechanical texture and physical properties are alike, always contain unlike quantities of the food of crops. It seems to make little difference how small is the amount of the lacking ingredient in the composition of cultivated plants. Its absence is fatal to the farther growth of the crop after its appropriate aliment fails in the soil. It is easy to discover the wisdom of this universal law. Suppose nature should organize grass, grain, and other plants which serve as the daily food of all the higher orders of animals, as well without bone-earth (phosphate of lime) as with that mineral—would it be possible for such grass and grain to yield to the blood of domestic animals, and of man himself, that solid earthy matter which imparts strength to human bones, and to those of oxen, horses, sheep, and swine? Certainly not. Although *iron* is always present in the food and blood of animals, no farmer ever killed a calf, a pig, or an ox, which had iron for the frame of its system. No anatomist ever saw a bone in the body of a person formed of other earthy atoms than such as Providence had fitted for that peculiar function in the animal economy.

The brains and muscles of all animals contain both sulphur and phosphorus, as constituent elements. If their daily food, derived as it is from the soil, lacked either sulphur or phosphorus, must not this radical defect in their nourishment soon induce weakness and disease, and finally result in premature death? To prevent consequences so disastrous and so obvious, nature refuses to organize plants without the presence in the soil, *in an available form*, of those peculiar atoms adapted alike to the wants of vegetable and animal vitality. This wise provision should be carefully studied by every one who desires to enjoy sound health and a long and happy life. Most of "the ills that flesh is heir to," as well as most maladies of plants, have their origin in the violation of nature's laws.

The growth and constitutional vigor of all living beings, not less than the revolution of the earth on its axis, are governed by immutable laws. One of these appears to be that an atom of carbon (charcoal) shall not perform the function of an atom of iron; nor can an atom of iron perform the office of an atom of carbon, or that of any other element concerned in the organism of plants and animals.

There are only some fifteen kinds of elementary bodies used by nature in forming every vegetable and animal substance, produced on the farm, in the orchard, or in the garden.

The science of rural economy consists in the systematic study of atoms, and of the laws by which they are governed, whether they exist in solid or crumbling rocks, in loose earths, in vegetable or animal mould, in fermenting manure, in the living tissues and cells of organized beings, or in the form of invisible gases diffused through the atmosphere. Every product of agricultural labor is either a vegetable or an animal substance; and in its production, not an atom of new matter is called into existence; nor is it possible to annihilate an atom when it decays.

In the language of science, all matter which is neither vegetable nor animal, including air and water, is *mineral.* All minerals are either solids, like sand, clay, and lime; or liquids like water, or gases like common air. The farmer deals largely with atoms in each of these forms; and hence he should be familiar with the several sciences which treat of the natural phenomena witnessed in the mineral, vegetable, and animal kingdoms. He should know that plants alone subsist on mineral or disorganized food—that if there were no plants in the ocean nor on the land, neither marine nor land animals could have a being. In the absence of all vegetation, it is obvious that all animals must be carnivorous, or cease to consume organized aliment. Being wholly dependent on mutual destruction for the means of subsistence, every day would diminish the aggregate supply of food, and the last animal would soon die of starvation.

From the above reasoning, it is plain that vegetable life is older on this planet than animal life; and that plants may have flourished thousands of years before the lowest type of being which depended wholly on organized food for subsistence, was created. It will also be seen that the line of demarkation between animals and plants is well defined, by the fact that the latter can organize the elements of all vegetable and animal substances into compound bodies, which the former cannot do. All plants produce and increase organized matter; all animals consume and diminish the quantity of organized food.*

CHAPTER II.

What the Country has lost by Impoverishing its Soils.

Taking the census of 1840 as the basis of the calculation, and adding no more than the usual increase, including immigrants, the number now employed in agriculture in the United States does not vary much from five millions. The number of acres which they cultivate is not known. In the State of New York, there are some twelve million acres of improved land, which includes all meadows and enclosed pastures. This area employs about five hundred thousand laborers; being an average of twenty-four acres to the hand. At this ratio, the number of acres of improved land in the United States is one hundred and twenty millions. But New York is an

* See Dumas' Balance of Organic Nature.

old and more densely populated State than an average in the Union; and probably twenty-five acres per head is a juster estimate for the whole country. At this rate, the aggregate is one hundred and twenty-five millions. Of these improved lands, it is confidently believed that at least four-fifths are now suffering deterioration in a greater or less degree.

The fertility of some, particularly in the planting States, is passing rapidly away, in others the progress of exhaustion is so slow as hardly to be observed by the cultivators themselves. To keep within the truth, the annual income from the soil may be said to be diminished ten cents an acre, on one hundred million acres, or four-fifths of the whole.

This loss of income is ten millions of dollars, and equal to sinking a capital of one hundred and sixty-six million six hundred and sixty-six thousand dollars a year, paying six per cent. annual interest. That improved farming lands may justly be regarded as capital and a fair investment when paying six per cent. interest, and perfectly safe, no one will deny. This deterioration is not unavoidable, for thousands of skillful farmers have taken fields, poor in point of natural productiveness, and, instead of diminishing their fertility, have added ten cents an acre to their annual income, over and above all expenses. If this wise and improving system of rotation tillage and husbandry were universally adopted, or applied to the one hundred million acres now being exhausted, it would be equivalent to creating each year an additional capital of one hundred and sixty-six million six hundred and sixty-six thousand dollars, and placing it in permanent real estate, where it would pay six per cent. annual interest. For all practical purposes, the difference between the two systems is three hundred and thirty-three million three hundred and thirty-three thousand dollars a year, to the country.

There is another view of this important subject which is worthy of profound consideration. Of the twelve million acres of improved land in the State of New York, one million are so cultivated as to become richer from year to year. These improving soils are in the hands of forty thousand cultivators, who take and read agricultural journals, and nobly sustain the State and county societies of that commonwealth.

Three million acres of the twelve millions are so managed as barely to hold their own in point of fertility. These lands belong to a class of farmers who do as well as they know from personal observation, and seeing how reading men improve their estates and domestic animals.

Eight million acres are in the hands of three hundred thousand persons, who still adhere to the colonial practice of extracting from the virgin soil all it will yield, so long as it will pay expenses to crop it, and then leave it in a thin poor pasture for a term of years. Some of these impoverished farms, which, seventy-five years ago, produced from twenty to thirty bushels of wheat on an average per acre, now yield only from five to eight bushels. In an exceedingly interesting work entitled "American Husbandry," published in London in 1775, and written by an American, the following remarks may be found on page 98, vol. i. "Wheat in many parts of the province (New York) yields a larger produce than is common in England. Upon good lands about Albany, where the climate is the coldest in the country, they sow two bushels and better upon an acre, and reap from *twenty* to *forty;* the latter quantity, however, is not often had, but from twenty to *thirty are common;* and with such bad husbandry as would not yield the like in Eng-

land, and much less in Scotland. This is owing to the *richness* and *freshness* of the land."*

According to the State census of 1845, Albany county now produces only seven and a half bushels of wheat per acre, although its farmers are on tide water and near the capital of the State, with a good home market, and possess every facility for procuring the most valuable fertilizers. Dutchess county, also on the Hudson River, produces an average of only five bushels per acre; Columbia six bushels; Rensselaer eight; Westchester seven; which is higher than the average of soils that once gave a return larger than the wheat lands of England even with "bad husbandry."

Fully to renovate the eight million acres of partially exhausted lands in the State of New York, will cost at least an average of twelve dollars and a half per acre, or an aggregate of one hundred million dollars. It is not an easy task to replace all the bone-earth, potash, sulphur, magnesia, and organized nitrogen in mould consumed in a field which has been unwisely cultivated fifty or seventy-five years. Phosphorus is not an abundant mineral anywhere, and his *sub-soil* is about the only resource of the husbandman, after his surface soil has lost most of its phosphates. The three hundred thousand persons that cultivate these eight million acres of impoverished soils annually produce less by twenty-five dollars each than they would if the land had not been injured.

The aggregate of this loss to the State and the world is seven million five hundred thousand dollars per annum, or more than seven per cent. interest on what it will cost to renovate the deteriorated soils. There is no possible escape from this oppressive tax on labor of seven million five hundred thousand dollars, but to improve the land, or run off and leave it.

That the latter has been done to a large extent is shown by comparing the population in rural districts, at the census of 1830, with that of 1840. In nearly half the towns in the State, population had decreased notwithstanding the rapid growth of cities and villages, demanding an increase of farm laborers to supply the mere local markets. The canals of New York have operated to hasten the exhaustion of its arable lands; just as a railroad to California would aid in extracting gold dust from its now unwashed sands. While the canals and railroads of New York convey a thousand tons of the few *precious atoms* in the surface of the earth which can alone form bread and meat, to tide water, they do not carry back from tide water one ton of the raw material for making crops of any kind. A million tons of human food pass down the Mississippi, where one ton of the elements of such food ascends the "father of waters."

It will be seen, on referring to the census of 1840, that the five States of Maryland, Virginia, North and South Carolina, and Georgia, employed at that time one million thirteen thousand four hundred and sixty-three persons in agriculture. Of this number Maryland had sixty-nine thousand eight hundred and fifty-one; Virginia three hundred and eighteen thousand seven hundred and seventy-one: North Carolina two hundred and seventeen thousand and ninety-five; South Carolina one hundred and ninety-eight thousand three hundred and sixty-three: and Georgia two hundred and nine thousand three hundred and eighty-three.

It is a statistical question of considerable importance, to determine how much less these laborers, and the mules, horses, and oxen which they work,

annually produce, than they would, had no acre of arable lands in these States, so highly favored by climate and fertility, been damaged in the least by improper tillage. The difference in the cost of making crops on poor land and on good land is much greater than is generally supposed. The shrewd farmers of Massachusetts prefer giving sixty cents a bushel for western corn rather than grow this grain on their less fertile soils: while the corn-growers of Indiana and Illinois are glad to sell their crops made on rich land at twenty cents a bushel. From these facts, is not the inference plain and satisfactory, that it costs three times more to produce a bushel of corn on *poor* than on *rich* land? To do full justice to this interesting problem, by what means and to what extent the soils of the five States above named have been injured, would fill a volume.

A residence of more than two years in the most southern of these States, connected with its agricultural press, and devoting much time to the study of soils and their products, warrants the writer in expressing an opinion on the weight of evidence collected from all sources within his reach. The annual loss on the labor of each hand and mule is believed to be thirty dollars. This estimate is too high for some plantations and too low for others. The only reason why so many slaves have been sent south during the last twenty-five years (and thousands out of Georgia) is, that the labor of a person is worth twice as much to cultivate rich, fresh land, as poor, old land. If the estimate of a yearly loss of thirty dollars on each hand and the domestic animals which he works be not too high, then the aggregate exceeds *thirty millions of dollars.*

This is equivalent to having sunk a productive capital invested in farming lands at a cheap rate, *of five hundred millions of dollars*, yielding six per cent. annual interest. While England and France have derived hundreds of millions in profit and revenue, from the tobacco and cotton exported from Georgia, the Carolinas, Virginia, and Maryland, a large share of all the proceeds received from these staples, which have so desolated the earth over immense districts, has left these old impoverished States, with their emigrating citizens, never to return.

This unwise system of tillage is extending rapidly in the United States. Manufacturers, merchants, and mechanics often shift their settled policy, when they see a profit in making a change. But whoever expects millions of isolated farmers to change suddenly their practices, ideas, and systems of culture and husbandry, shows that he has not labored twenty years to substitute an improving for an exhausting system of field culture. At a fair estimate, there are at this time two million seven hundred and forty-one thousand nine hundred and sixty-six persons employed in agriculture in the fifteen slave-holding States. Before the study of rural economy as a science will become as popular as the study of politics, law, and medicine, the South will have at work in the field a force of five millions of operatives. Who does not see that the wise and skillful employment of this vast power of production is a matter of inestimable consequence to all the planting States and to unborn millions who must dig their daily bread from impoverished soils, if the mighty work of land exhaustion is to increase and extend as population spreads over the cotton, tobacco, and sugar-growing portions of the Union? Propagated by buds instead of seeds, the sugar-cane will be found, like the potatoe plant, less able to withstand the customary abuses of nature's laws than tobacco, corn, wheat, and cotton plants. But all these are suffering in vital force and constitutional vigor by reason of their defect-

ive food in partially exhausted soils. Any living being may habitually take a very little poison into its system without destroying life. Pursue the practice of poisoning only to a very small degree, and it will tell in the course of a few generations in strange, new, and incomprehensible maladies. An instructive and useful book might be written on the diseases of cultivated plants; to say nothing of those of domestic animals. Mildew, mould in cheese, rust on wheat and cotton, and the fungi believed by naturalists and botanists to be so injurious to potatoes, are all in a good degree, like other vegetable creations, subject to the control of human industry and science.

If we visit the farmers of the North West, we shall find the popular feeling developing itself after this fashion: "Let us construct railroads and canals, improve our navigable rivers and lake harbors, purchase the best farm implements, and then employ all our capital and energies in transforming every atom in the soil which will make grain, provisions, and wool, into those marketable commodities, and send them to distant cities and nations for consumption."

This agricultural and commercial enterprise is complacently regarded as the proper development of the agricultural resources of a new country! Although the inevitable results of this practice may be seen in each of the old thirteen States, as in the valleys of the Mohawk and Hudson, yet it is confidently believed by sanguine farmers that the truly rich soils of the west are inexhaustible. Whoever will carefully examine this great national question, of taking everything out of the land and putting nothing back, must be satisfied that no other than the most disastrous consequences can follow. The number of laborers employed in this simple operation increases at the rate of two hundred thousand a year, in the United States.

CHAPTER III.

By what Processes the Earth is impoverished.

THERE are three principal ways in which the natural fruitfulness of the earth may be seriously impaired.

1. By removing its natural products: as when a prairie is annually mown for a series of years, and all the hay removed, and no manure or other fertilizer returned. In Europe, where forest culture is practiced, experience has shown that to remove the leaves that annually fall upon the ground to rot and form mould over the roots of trees, is sure to impoverish the land and injure its valuable products. These leaves, as well as prairie grass, contain both earthy minerals called *inorganic* matter, and combustible elements usually designated by the term *organic* matter. In burning over prairies, the latter portion of the plants consumed is alone removed from the soil; their *ashes* remain on the ground where the plants grew. Pastures are deteriorated by the loss of the grass carried off in the stomachs of domestic animals.

2. Soils are impoverished by tillage without cropping, or removing any plant whatever. No fact in agriculture is more important than this: All tillage is purely an artificial and withal a most unnatural operation. Nature never ploughs, nor harrows, nor hoes the earth to promote the growth of vegetation. Her highest productiveness is the result of laws, which every

farmer should carefully study and learn to follow, in the renovation of cultivated fields.

Although all tillage is a mechanical process, yet its effects are both chemical and physical on the soil. So far as the chemical results of tillage are concerned, they are quite independent of all crops and other plants. It is not so easy a task as some may suppose to explain, in a few plain words, the several changes wrought in the mould and inorganic part of soils, by the plough, spade, and hoe. The mechanical and physical effects of tillage are very obvious to every cultivator. The earth is *mellowed*—rendered exceedingly porous and admirably fitted not only to absorb atmospheric air, and all gaseous bodies, but to *condense* them in the innumerable pores of the friable mass. The same causes which increase the fertility of a fallowed field exhaust the soil, if long continued, although no crop should be grown upon it. If, however, a crop of weeds, grass, peas, or clover be grown and allowed to die and rot on the ground or be ploughed in, the soil will be enriched by the operation. But if a field be annually ploughed and hoed, as for a crop of corn, tobacco, cotton, or sugar-cane for twenty-five years, and no plant whatever be allowed to grow on its surface, the mechanical and chemical changes, associated as they must be with the leachings and washings of innumerable rains, would result in removing from the surface of the earth nearly or quite all of its vegetable mould and the soluble mineral food of plants. To test this principle in nature, suppose a farmer were to apply twenty-five loads of well rotted stable manure upon an acre of land, and plough, harrow, and hoe the ground twenty-five years, as for crops of corn or cotton, but plant nothing and permit neither grass nor weeds to grow thereon. Would any of the dissolved elements of this manure remain that length of time in the surface soil? Certainly not. If manure will decompose and disappear like wood consumed in a fire-place, may not vegetable mould do so likewise? And if the mineral known as common salt and salts of lime and potash will readily dissolve on the ground in rain water, and pass in a state of solution deep into the earth and reappear in springs, wells, and rivulets, may not similar minerals naturally in the soil, and rendered soluble by tillage, be also dissolved and washed out of the mellow ground into the compact sub-soil, or into swamps, rivers, and the ocean?

The principal object of ploughing and hoeing is to increase the quantity of available food for the crop; but while the plants are present in the soil and growing, it is by no means certain that all the manure or other fertilizers applied to the land, or all the elements of the crop naturally in the soil, enter the roots of cultivated plants, and appear at the harvest.

Under certain circumstances, the loss by leaching and solar influences is very large. In producing small crops of corn, cotton, wheat, and other plants, the waste of raw material is far greater in proportion to the harvest, than in large crops whose roots and foliage cover the surface both in and above the soil universally. Small corn or cotton plants, and these quite distant one from another, greatly favor the volatilization of all volatile substances and the washing away of all soluble elements.

3. *Tillage and cropping* exhaust land faster than it can be done in any other way short of carting off the surface soil in a mass. The degree of injury inflicted by this operation is very variable: not only on different fields, and soils, but on the same surface at different times and seasons. A light, open, sandy soil that has no clay foundation will not bear ploughing

and cropping so long, with so small deterioration, as the same soil with a clay sub-soil. Light, sandy soils abound in North Carolina, Virginia, Maryland, Georgia, and South Carolina, and most of these when fresh yield fair crops. Their red clay lands are not so easily worked, but are more enduring and generally more productive.

The limestone soils of the Cherokee country, of Tennessee, Kentucky, Missouri, and other States, are altogether different from any formed from the *debris* of granitic, metamorphic, and sand rocks. It is impossible to form an intelligent opinion of the exhaustion of a soil by any given amount of tillage and cropping, without knowing something of the *parent rocks* from which the earth was derived, and something of its physical and chemical properties. A knowledge of the principles of geology and chemistry is invaluable to one who desires to understand in advance what are the natural capabilities of any arable land; and what elements of crops it is most likely to have in too small a quantity.

It often happens that a soil partakes very little of the character of the rock that lies but twenty or thirty inches below its surface.

This is owing to the circumstance that a different kind of rock has furnished the earthy matter deposited above the solid strata. In several counties in Western New York, the soft Medina sandstone has been comminuted and carried by tidal currents, glaciers, icebergs, or some other moving force, many miles southward, and spread over lime-rocks, hundreds of feet higher than the parent sandstone, both geologically and topographically. Although resting on lime-rock, these soils often lack lime to a degree.

The durability of a soil is governed, in an eminent degree, by its texture and hygrometric properties.

Tenacious clay lands retain fertilizing salts with peculiar and remarkable affinity. When well drained and thoroughly tilled, they yield up their nutritive constituents as fast as is profitable. Where one has but a small surface to operate on, the application of clay to sandy soils is very useful. The deeper and more thoroughly one cultivates his land, removes all that it produces, and makes no adequate restitution, the faster will he impair the natural capabilities of his soil. No matter with what skill and science a farmer extracts immense crops from his fields; the larger the amount of potash, soda, magnesia, soluble flint, phosphorus, sulphur, chlorine, and organized nitrogen, carried off in crops, the poorer his land must become, unless a part of all these ingredients be returned to the earth whence they were taken.

It is impossible to say, with any approximation to the truth, in the present infancy of agricultural science, how much of the inorganic food of plants may be safely removed from year to year in grass, milk, meat, or grain, in cotton or tobacco, from an acre of common fair land, without detriment. A little of dissolved sand, lime, potash, magnesia, sulphur, mould, and phosphorus may be spared from the poorest soils, without injury; while some so abound in the elements of crops as to furnish an amount twenty times larger, without exhausting the supply of earthy minerals. This point will be farther discussed in the next chapter.

CHAPTER IV.

What is the available Capacity of the Farming Lands in the United States to feed and clothe the Human Family?

No question, either in rural or political economy, is more important than the above. What the soil can do, and what it cannot do, are questions of fact, about which every American citizen should be well informed.* That the principal wealth of the United States lies in its vast agricultural capabilities, is apparent to all; but this general appreciation of an important truth fails to impart to the understanding any definite idea of the capacity of any given farm to produce grain, cotton, or provisions, by any system of tillage and cropping.

As it is a law of nature that mankind shall increase in numbers, and consume a corresponding increase of food and raiment, it is obvious that no system of agriculture that does not improve the soil *a little* in the lapse of ten or twenty years, can be a wise system for the community at large. Nor is it, upon the whole, of any advantage to a farmer or planter, to work up the raw material of cultivated plants in a virgin soil, in the course of a few years, and then abandon his exhausted fields and clear new ones.

That fortunes have been realized by operations of this kind, is not denied; but no planter who has followed this popular practice has made more money thereby than he might have done by so cultivating the soil as to increase, instead of diminishing, its natural fertility. It may be conceded that his fresh lands cost him not over three or five dollars an acre; and that, after one thousand acres have been so impoverished as not to pay a profit on their cultivation, another thousand acres may be had at the cost of the first; still it can be shown, both by practice and theory, that less profit is attainable by this course than by a system of planting founded on scientific principles.

If the cultivator had to apply to his soil one hundred pounds of manure or other fertilizing matter, for every one hundred pounds harvested and removed in the crop, then to wear out the virgin earth would give one vastly more ready cash than to attempt to feed plants with all the atoms consumed in their growth. Fortunately, no such necessity exists. In the wise economy of nature, it is not probable that more than an average of one pound in ten of the dry weight of cultivated plants, including their roots, stems, leaves, and seeds, is formed of matter which existed as a part of the solid substance of the soil in which the plants grew. Several experiments have been made by the writer for the purpose of determining what percentage of wheat, corn, and potatoe crops is composed of atoms derived from mould, silica (sand), lime, potash, &c., extracted from the soil; and what part was derived from water, carbonic acid, and other gaseous elements known to exist in

* We greatly need additional experiments to test in a reliable manner both the natural capabilities of soils and the productive power of different fertilizers. The simple fact that three hundred pounds of guano often give a gain of twelve hundred pounds in corn and six hundred in wheat crops is full of promise in favor of concentrating manures. In hauling out one hundred loads of barn-yard manure, the farmer carries on an average eighty loads of water. Water is often very valuable, but it will hardly pay to haul it half a mile or more, in a cart or wagon, to irrigate a field. The great weight and bulk of manure must be got rid of, without impairing its productive power.

the atmosphere. Wishing to repeat these researches on a larger scale before publishing, no account of them has been made public.

The science of feeding plants is in its infancy; and very little public encouragement has been held out to any one to devote his time and money to investigations of this character. The little attention paid to the feeding of wheat in England has resulted in raising the average product from sixteen to thirty-two bushels per acre. If a small share of the talent and public patronage of this country could be turned to the study of vegetable and animal physiology in their connection with farm economy, and to chemistry, entomology, agricultural geology, and meteorology, unquestionably the average of our wheat, corn, and cotton crops would soon be doubled. The most important point is to learn what food, and what quantity per acre, will yield the largest annual profit. In addition to this, it is desirable to know what sources of supply of the raw material for making crops, so far as it is lacking in the soil, can be most economically resorted to by the farmer.

His sources of supply are numerous; among others, the subsoil and the atmosphere may be named as always available on the poorest lands. It is very rare, if ever, that a soil is so sterile that when three inches deep it cannot be made six; and if six inches deep, it may not be made twelve. If the reader will reflect on the facts of the case for a moment, he will be satisfied that the same resources in the earth and atmosphere, in rains, dews, solar light, and heat, which produce a little mould on the surface, extract a little lime, potash, magnesia, and soluble flint from the subsoil, may reasonably be expected to yield something more of all these elements of fertility, if they are skillfully husbanded from year to year. But, if these elements are all sold and sent off the farm; or if wasted thereon, no matter how, an increase of productiveness is impossible, unless guano or manure from abroad is bought for home consumption. Vegetable mould can only be increased by growing plants; and even then, different plants form mould, when they decay, of very unequal value in its adaptation to the peculiar wants of crops. As the science of feeding plants rests on precisely the same principles as that of feeding animals, and as plants alone have the power to subsist on disorganized minerals, such as air, water, sand, and lime, it is all important to grow such fertilizing and renovating vegetables as will best furnish nutriment to the plants to be cultivated for market. Thus, one thousand pounds of broomsedge, rotting on an acre, will yield mould far inferior to that of a like weight of pea-vines. In some respects, the sedge will have the advantage. It will supply more soluble silica than an equal weight of the stems, leaves, roots, and seeds of the pea plant, but much less of sulphur, phosphorus, and organized azote or nitrogen. Theoretically, the slow rotting of broomsedge, followed by the more rapid decay of pea-haulm, will prepare a soil for wheat or corn, better than to have it entirely free from either sedge or pea-vine mould. Different forest leaves furnish mould as unlike in value as that formed from rotting cabbages and decaying pine wood. But if a ton of cabbages or clover will form a mass of rich mould, it will require something better than very poor land to grow either clover or cabbage. They are both rich in sulphur, phosphorus, and nitrogen, elements that do not abound in sterile soils.

It is difficult to see how one can fairly begin to comprehend the natural capabilities of American soils, before he is familiar with the science of meteorology and the philosophy of manures. An acre of land lying in the latitude of Washington and St. Louis has the capacity to produce nearly

double the food for man or beast that an equal area in the centre of Great Britain possesses; assuming the chemical composition and physical character of the soils to be alike in both countries; the fall of rain alike, and the only difference being in the length of seasons and a higher mean temperature and more sunshine in America than in England. There are few, if any, plants which equal our maize or Indian corn, in yielding a large quantity of bread on a small surface. In England, it is impracticable to grow one good crop of this cereal in a year. In the District of Columbia, on choice land, nearly, if not quite, two crops can be made in a season. Suppose the object was to produce milk (an exceedingly valuable article of food), not only can we grow twice as much corn for soiling cows on an acre, under American sunshine, as can be raised in Great Britain, but after frost sets in and before it is time to plant corn in the spring, a crop of winter wheat, rye, or barley can be two-thirds grown in Virginia, and harvested in Georgia, Alabama, Mississippi, Louisiana, Florida, and Texas. An acre of land in central Georgia will both feed and clothe two persons as well, and more economically, than the same area of soil of equal fertility will feed and clothe one person in the State of Maine. In the latter, only one crop can be made in a year; in the former, *three* can be grown, and two of them will contain an extraordinary weight of organized matter.

It must be remembered that the same high degree of solar light and heat which greatly favors the rapid as well as the prolonged growth of vegetation, promotes also in an equal degree the consumption of mould, and the exhaustion of the soil, if its crops are all removed, or if its tillage be unwisely directed. On comparing the fall of rain in Georgia with that of New York, the writer finds that as much water often falls, in twenty minutes, in the Southern as in forty minutes in the Northern States. Some thirteen inches of water fell in the month of July, 1849, in the city of Augusta, Georgia. The mechanical washing of cultivated fields at the South is an evil of no inconsiderable magnitude. To remedy this, good planters resort to horizontal ditching around hills, or on their slopes, so as to convey by a gentle inclination the surface water off, without cutting deep gulleys in the earth. Many of these conduits are constructed with commendable skill and scientific engineering, guided by a spirit or water level. The object sought is not to have the ditch so level with the horizon as to fill in a heavy rain and permit the water to break over its bank on the lower side; nor with such an inclination from the upper to the lower part of the side hill as to create a *washing* current in the ditch itself. It is also indispensable that these ditches be not too far apart. Too much care can hardly be taken of the soil to prevent its injury in any way. It is hard to persuade men that the intrinsic value of arable land is wholly independent of its market price—that to damage a soil which costs three dollars per acre is as injurious to society as it would be if it cost thirty dollars per acre.

The common interest which all have in the enduring fruitfulness of the earth has received very little attention in this country. Nothing is more certain than the fact that a district or State which exports largely the things which nature demands to form breadstuffs and provisions, must sooner or later export also some of its consumers of bread and meat. For the ten years preceding 1846, Ireland exported more bushels of grain than all the United States.*

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* See McCulloch's Commercial Dictionary, and the official returns of this country in a table in this Report.

Although much of the grain sent from Ireland was oats, all farmers know that this is quite an exhausting crop. Nor did the people of that ill-fated island restore to their potatoe fields all the atoms removed in crops. Hence the plant failed to a signal degree; famine ensued, hundreds of thousands perished, and still more fled to England, Scotland, and America. Probably no State in the Union has done so much in the way of exporting its fertilizing atoms to other States and foreign nations, and wasting them at home, as Virginia. Next to New York, she has the largest number employed in agriculture. The practical result of this policy has been that she has lost more farm laborers, more citizens and more capital removed with these emigrating citizens, than any other State in the Union. This must always be the case the world over, except where the overflow of great rivers, or other means, serves to renovate the soil, exhausted by excessive cropping, or bad husbandry. The fact should be universally understood that a State can feed and clothe a population ten times larger at home than it can abroad. This result occurs from the circumstance that the peculiar atoms, indispensable to form food and clothing, exist in the soil only to a very limited extent. If this were not the case, England would not send hundreds and thousands of ships to distant islands and coasts to gather the dung of sea-birds solely to increase her annual crops. If no fertilizers were wasted in England, this expense need not be incurred.* Belgium sustains a population of three hundred and thirty-six to the square mile. With a population equally dense, Virginia would contain twenty-two million seventy-five thousand two hundred souls. Belgium, by the attention paid to saving manures, and with a climate inferior to that of the "Old Dominion," is able to export no inconsiderable quantity of beef, mutton, pork, butter, cheese, and some grain. It has nearly three million four hundred and twenty-two thousand five hundred and seventy-four hectares of land.† Of this, one million seven hundred and seventeen thousand three hundred and fifty-four are arable, and six hundred and forty-nine thousand nine hundred and fifty-two are in wood and forests. Prairies and meadows cover an area of four hundred and thirty-nine thousand five hundred and ninety-four hectares. Waste lands in uncultivated tracts four hundred and twenty-eight thousand two hundred and ninety-one. In his "Agricultural Survey of Flanders," Mr. Ratcliff says that the dairy-men keep their cow stables the year round as near as may be at the temperature of the month of May. Cattle (neat) are fatted and sold when two years old. The average number so disposed of, every year for fourteen years, was eight hundred and ninety-eight thousand and seventy-six. The soil in Flanders is naturally poor, and the maxim is, "Without stall-fed cattle no manure,

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* For all practical purposes, fertilizing atoms are eternal; and so far as they are needed to form the products of rural industry, they should be retained in the service of man a thousand years. The whole system of crops forming manure, and manure forming crops, implies that there should be no waste of the least abundant elements of cultivated plants. An atom of potash, which aids in organizing the elements of water and carbon into starch in a kernel of corn in 1850, may perform a similar function every summer for the next one hundred years, if it be carefully preserved when it escapes from the body of the animal that eats the corn. In all its mutations of position and chemical combination, it can never be aught besides an *atom of potash*. Being so indestructible and valuable, why annually throw away potash enough to form a thousand million bushels of corn in the United States? What becomes of that contained in all the food consumed by twenty-two million people in this country? This is but *one item* of our loss of this and many other fertilizers.

† A *hectare* is a little less than two and a half acres (2.47).

and without manure no crops." To say nothing of the keep of dairy-cows, working oxen, horses, sheep, and swine, the people themselves equal one to every arable acre in the kingdom. Speaking of the "agricultural produce and practice" of Belgium, Mr. McCulloch remarks: "Corn (wheat), flax, hemp, and *timber* constitute the most important materials of the agricultural wealth of Belgium. The soil *artificially* enriched, produces commonly *more than double the quantity of corn required for the consumption of its inhabitants*, which is computed at six millions of hectolitres (each two and three-quarter bushels) per annum." This gives an aggregate of sixteen million five hundred thousand bushels of wheat. The six hundred and forty-nine thousand nine hundred and fifty-two hectares (over one million five hundred thousand acres) in woods and cultivated forests, yield a large profit in timber. The fact is the more worthy of note because of all the extravagant abuses of the bounties of Providence in this country, a reckless waste of timber is the least excusable. Timber is about as necessary as bread; and it requires a vastly longer time to grow a good oak than it does to fell one or grow a crop of corn. There are small forests of black locusts in this country which yield from twenty-five to fifty dollars worth of railroad ties per acre a year, with no very expensive culture. The grand secret of Belgian farming lies in their producing, keeping from loss, and good sense in applying manures. Of all civilized nations, we pay least attention to this part of good husbandry. Not one farmer or planter in a thousand appreciates the fact that the more fat cattle, fat hogs, or sheep he keeps, the more grain, tobacco, or cotton he can make on his farm. It is stated, on the above reliable authority, that the average for fourteen years of fat cattle sold in Belgium, was eight hundred and ninety-eight thousand and seventy-six head a year. The essential object in making so much beef (not a little of which is consumed in London), was the production of manure. The liquid excretions of a single cow sell at two pounds (ten dollars) a year.

Virginia sends to Massachusetts about a million bushels of corn per annum. If, in place of exporting this grain, it was fed to hogs and neat cattle and their meat exported, the manure derived from the grain consumed would give to the corn-growers of that State five hundred thousand bushels more corn in 1850 than they will now harvest. By pursuing the Belgian system a few years, the fertility of Virginia soils would be three-fold greater than it now is. The State could then spare more breadstuffs and tobacco than it now does without injury to the land. A rich man can spend more money from his large income than a poor man can spend from a small one, and not become bankrupt.*

* How to extract generous crops of grain, tobacco, and corn from a soil, with the least injury and the greatest economy, is a study which investigates the following among other questions of fact:—

When ten bushels of corn are consumed by fattening hogs, cattle, or sheep, and all the solid and liquid manure formed by the grain is saved, how much additional corn with the aid of the stalks and cobs well rotted that grew with the ten bushels of corn, will these fertilizers produce? I have said in the text that a gain of five bushels may be realized, but under the most favorable circumstances a gain of *twenty* is attainable. Manure enables plants to draw more aliment from the atmosphere and the earth, than they could command without such aid. It is precisely this function in what are called renovating crops, such as clover and grass at the North, peas, grass, rye, and barley at the South, that increases the natural productiveness of land. Clover and peas never create a particle of new matter. They consume sun-light and heat, water, atmospheric gases and minerals in the surface and subsoil, to organize their roots, stems, leaves, and

All business men occasionally take an account of stock; all manufacturers estimate the value of the raw material consumed in the course of a year's operations but the manufacturers of agricultural staples. The latter seem to think that nature forms sixty bushels of corn or thirty of wheat from *nothing*. If this were so, then all soils should be alike productive and manure of no value. This is not the fact; and the production of good manure is an indispensable part of good husbandry. Hence the keeping of domestic animals can never be dispensed with to advantage, till the human family reach a density of population of about one person to a half acre. After that, an animal belonging to the *genus homo* (man) will furnish all needful fertilizers. With all our pride, we should remember that we are but "dust."

To show the capacity of arable land to produce breadstuffs, and not attempt to reach the extreme limit which is unknown, it is enough to say that our climate is equal to the yield of thirty bushels of wheat and eighty of corn per acre, provided the plants are properly fed. How should a farmer feed corn plants on his soil which is equal to the production of fifteen bushels per acre, so that the same will, in the course of a few years, grow crops five times larger?

To do this without going off the field for fertilizers is the end to be attained. Without now going into the details of corn culture, which will be discussed under its appropriate head, it may be stated that, if all the stalks, blades, cobs, and corn in the shape of manure, or the stalks and cobs rotted without being consumed and the corn eaten to furnish manure, be annually restored to the land, it will increase rapidly in productiveness. Allowing one bushel to plant five acres, the one-fifth of a bushel of seed placed in the soil will receive the fertilizers derived from fifteen bushels of corn in the previous crop. At this rate, it is plain that the vital germ in each seed will have the benefit not only of all the nutritive matter stored up in that particular seed, but what is contained in seventy-five other seeds that formed the manure. Nothing is more obvious than the fact that the aliment in a seed, whether of cotton, wheat, or corn, nourishes the germ of the growing plant. Hence the fertilizing atoms derived from seventy-five other seeds, whether these atoms have passed through the system of any animal or not, will naturally develop more, longer, and larger roots in the plant, than it would without such aid.

These more numerous and more extended radicles enable the plant to imbibe food from a greater depth and from a wider and broader surface than it could otherwise command. Now, if we assume that the stalks, cobs, and corn of the previous crop of fifteen bushels are able to produce as much matter a second time, it will be seen that the second crop has a double advantage over the first. Whatever may be the positive gain, the farmer has only to repeat the operation, as is done in Flanders, to bring up his soil to the production of very large crops of corn. It is true that one hundred pounds of food of any kind eaten by an animal yield generally only about forty pounds of dry excretions; nearly sixty per cent. being discharged from the system through the lungs by constant respiration, and a little by sensible or insensible perspiration. But so much as goes into the atmosphere in this way, rains and dews bring to the earth again; and plants seldom lack

seeds. These rotting will feed cotton, wheat, corn, or potatoe plants in a direct and economical way. Deep and thorough tillage promotes the luxuriant growth of vegetation and the enriching of the soil, if its products be wisely husbanded.

carbonic acid, beyond what good stable manure will supply. The atoms discharged from the system through the kidneys cannot be dispensed with, no matter what animal eats the products of the soil.

Viewed as a philosophical question, the well-established fact that one hundred pounds of the dung of birds often produce three hundred pounds of wheat and five hundred of corn, is one of the most interesting in nature. Place man and his most urgent wants out of view, and why should one hundred pounds of gypsum ever augment a crop of clover one thousand or two thousand pounds? This salt of lime contains but eighteen and a half pounds of pure *sulphur*, yet it enables clover plants to extract twice that amount of this mineral from the earth, under favorable circumstances, by extending their roots deep into the sub-soil. How plants grow, and the art of feeding them as well as animals, are questions full of interest as matters of scientific research, irrespective of any practical importance that attaches to agriculture.

All cultivated plants and all domestic animals, not less than the soil, are susceptible of indefinite and very valuable improvement. Every advance of this kind virtually increases the productive power of the earth and of manual labor. But the most important improvement of all is to improve the farmer himself, that he may be able to read and understand the immutable laws of nature and uniformly obey the same, as they exist in the mineral, vegetable and animal kingdoms. His profession is a most intellectual one, and there is no good reason why the cultivator of American soil should not be the most thoroughly educated business man in the world. Great improvements are attainable; and if Congress and State Legislatures will render a little assistance in the way of collecting, annually, reliable statistics, that we may go to the people with facts and figures the truth of which none can gainsay, one hundred per cent. can soon be added to the productive industry of five millions of farm laborers. There is an undeveloped power of production in American soil and muscle, and above all in American mind, which ought no longer to be neglected. Although the science of human progress is in its infancy, yet the little that has been achieved within the last thirty years, and mainly by the study of natural phenomena and the application of the knowledge so acquired to all the purposes of civilized life, promises a tenfold larger harvest when science shall direct the culture and economy of every farm in the Republic. Few are aware how much honest hard work is worse than thrown away by its unwise expenditure.

III.

AGRICULTURAL METEOROLOGY.

There are few sciences the study of which is more useful to the farmer than that of meteorology. A soil may contain all the atoms required to form a luxuriant crop, yet if the temperature of the ground, or of the air above it, be too low, vegetation makes no progress. Again, the earth and atmosphere may have a due degree of warmth and light, as well as abound in all the food of plants in an available form, except *water*, and the absence of this element will be fatal to the hopes of the husbandman.

Atmospheric air, light, heat, electricity, rain, dew, snow and frost, exert a controlling influence over the growth of all cultivated plants. A knowledge of the natural laws by which these, generally invisible and imponderable bodies, are governed, so far as researches have revealed them, is alike valuable and interesting. The atmosphere and the numerous phenomena of which it is the theatre should command more attention in this country than they hitherto have received, if we intend to keep pace with the progress of physical science in Europe. To encourage the study of meteorology in its application to agriculture, is the object of this paper.

The Atmosphere is mainly composed of two distinct gases, which are invisible but not imponderable bodies, and everywhere surround the planet like an ocean. It has a mean depth of some forty-five miles. The gases which form the air are called *nitrogen* and *oxygen*. According to the accurate analysis of dry, pure air, made by MM. Dumas and Boussingault, one hundred parts consist of 20.8 oxygen and 79.2 nitrogen. These chemists found from two to five parts of carbonic acid in ten thousand of atmospheric air. Dr. Fresenius has ascertained that the proportion of ammonia in the atmosphere is one part in two millions, varying to one in three millions. Undoubtedly, there are many other volatile and gaseous bodies in the atmosphere, but in a state so extremely diluted and diffused as to escape all chemical tests. Sir Robert Kane found that sulphuretted hydrogen will pass through a thin piece of India-rubber into the atmosphere, against a pressure equal to fifty times the weight of common air.

Gaseous compounds of phosphorus, chlorine, and sulphur, are constantly discharged from decaying animal and vegetable substances into the atmosphere.

It is one of the laws peculiar to all gases, that the presence of one in any given space does not in the least prevent several others from occupying the vacancies between atoms of gas that seem to repel each other with singular aversion. The facility with which the atmosphere takes up vapor, when water evaporates, is familiar to all. This capacity to hold immense quantities of water imbibed from the ocean, lakes, rivers, the foliage of trees, and moist earth, in a volatile condition, to be distributed over broad

continents, is a wonderful provision of nature. But the filling of the air with water like a wet sponge is less remarkable than the contrivance for *squeezing the sponge*, so to speak, and causing the diffused moisture to fall in gentle rains, snows and dews. The drying of the atmosphere, after it is saturated with water, is a phenomenon, without which it would never rain; nor could there be any springs, rivers, land plants or animals on the globe. This precipitation of water is effected by a change of temperature; which change is the result of the revolution of the earth on its axis, and of solar heat. Day and night, spring, summer, autumn and winter, with their ever-varying temperature, varying winds and clouds, and constantly changing humidity, are all results of fixed laws, which invite the research of every reasoning mind.

Solar Heat.—According to Professor Forbes, the rays of heat coming from the sun and passing through the atmosphere in the shortest line, at the latitude of Paris, lose twenty-five per cent. of their calorific power by the time they reach the earth. Rays that strike the atmosphere at an angle of only twenty-five degrees, part with half their intensity or heat by the time they touch the ground. The molecules of air absorb and radiate heat into space the same as other ponderable bodies. Hence, no matter how clear the atmosphere, neither the rising nor the setting sun imparts so much light or heat to those parts of the earth so affected as they receive when the sun is at the meridian.

The effect of solar rays on the earth is still farther diminished morning and evening by the fact that fewer fall on any given area, because they impinge upon the surface obliquely. One can look at the setting sun with impunity, not because it emits less heat or light at that time, but because the rays are mostly absorbed and radiated in passing through many miles of atmosphere, before they reach the eye of the observer.

The facility with which solar heat penetrates and warms the soil to the depth of six, twelve, eighteen and twenty-four inches, and the radiation of heat from the earth, the leaves of plants, and all other substances, deserve particular notice. A distinction must be made between the radiation of heat from the surface of any body, and the transmission of it through any substance, as iron, wood, water, mould or soil. All these hold different relations to this peculiar element. It is not intended to take more than a popular view of this subject. At the time of seeding in spring, a single day is sufficient to warm to the depth of four inches a mellow soil, recently ploughed. Two days of sun will warm the ground six inches; and six days twelve inches. The fall of warm rain on a well-drained, mellow soil, greatly hastens the heating of the earth. On the contrary, the fall of cold rain, or much cold water in the ground, greatly retards the rise of temperature in tilled land. Heat and water should be studied together, if one would obtain a clear idea of their joint influence on vegetation. When water evaporates, it expands to sixteen hundred and ninety-six times its former volume, and renders latent, or insensible, a considerable amount of active heat. Hence, a wet piece of ground, from the surface of which a good deal of water evaporates, is always cooled by the constant loss of sensible heat, which rises in vapor, and departs far into the atmosphere.

The warmer the atmosphere the greater its capacity to hold water in the condition of a diffused, invisible vapor. The lower strata of air are heated much more by caloric radiated from the earth than by the absorption of

heat in its passage from the sun to the planet. Air thus heated becomes expanded or rarified, and specifically lighter than the colder air above it. This causes the air within and near the tropics to rise high above the surface of the earth, and flow over both north and south, toward either pole; while colder and heavier air rushes in toward the equator to fill the empty space. These aerial currents are deflected in their courses by the diurnal revolution of the earth, and by mountain ranges whose summits are often covered with eternal snow; and they are still farther modified by the varying temperature of the ocean, and its peculiar streams.

Heat and water are the fruitful parents of winds and clouds. When aqueous vapor is precipitated in rain or snow, heat that was latent becomes again sensible, and by increasing the capacity of the air to hold water in the form of vapor, prevents a disastrous deluge of this abundant element in nature.

The laws which restrain the precipitation of water from clouds are no less curious than those which cause it to rain at all. The atmosphere must approach saturation before it can rain; and it usually happens that the quantities which will fall on a given area one hundred feet above the ground, and on the earth, are unequal. Large drops in falling through many feet of dry air become smaller by constant evaporation, and may be wholly dissipated before they reach the earth. On the other hand, quite small drops formed in cold regions high in the air constantly condense more vapor in falling through a saturated atmosphere, and will be many times larger when they reach the ground than at their starting point.

To illustrate the production of rain, let us suppose that a current of air at seventy degrees temperature, saturated with moisture, meets and mingles with another current, also saturated, but having a heat of fifty degrees. Now, if the atmosphere at the mean temperature of sixty degrees had a capacity to hold water as an invisible vapor, equal to the mean of seventy degrees and fifty degrees, it is obvious that no precipitation would take place. But such is not the fact. The quantity of water held in air, heated from sixty to seventy degrees, cannot be contained in that heated from fifty to sixty degrees. In other words, whatever cools air, saturated with moisture, causes a cloud, dew, mist or rain.

Early and late frosts are produced by the radiation of heat during clear nights, from the foliage of plants and other terrestrial bodies. If the temperature of the air is not very low at sundown, and it is humid, vegetation will so soon reach the *dew-point* that the latent heat evolved by the formation of much dew will prevent a frost. If the atmosphere is dry, clear and still, the dew-point is lower, and all the circumstances are favorable to freeze the little vapor condensed on such substances as radiate heat with the greatest facility. Anything which checks the radiation of heat, like a cloud, smoke, screen, or wind which agitates the atmosphere, serves to prevent frost.

Every farmer should have a thermometer and rain-guage, and know the degree of heat most favorable to all his crops. The due temperature and moisture of the soil are as much elements of production and profit as good manure and skillful tillage.

The writer has studied the growth of corn in different months, noting the changes from four o'clock A. M. to M.; from noon to eight P. M.; and from eight P. M. to four A. M. When the temperature is favorable, corn grows as much per hour in the night as in the daytime.

No agriculturist is so far advanced in the science of climatology as to

make all that can be made of the water, solar light and heat, which nature so bountifully supplies. There is no State in the Union where the mean temperature of summer is too low to ripen maize, or corn, as is the case in England, Scotland and Ireland. The cutting down of too much timber in some parts of the country has operated to change, in some degree, the climate, and render large districts more subject to alternate droughts and rainy seasons. In summer, when frequent and moderate rains are greatly needed, the air is too dry to yield much more than respectable dews, for many weeks in succession.

To learn the well-authenticated results of clearing forests, in drying up natural springs, and changing climates, regularity of rains, &c., the reader is referred to the writings of Humboldt, Kaemtz, Forbes, Boussingault, and other meteorologists. Humboldt remarks, "In felling trees which cover the crowns and slopes of mountains, men in all climates seem to be bringing on future generations two calamities at once—a want of fuel and a scarcity of water."*

The waste of valuable timber in the United States, to say nothing of firewood, will hardly begin to be appreciated until our population reaches fifty millions. Then the folly and short-sightedness of this age will meet with a degree of censure and reproach not pleasant to contemplate.

Different plants require unlike degrees of heat and light to bring them to maturity. The potato will produce an edible tuber at a mean temperature so low that neither its own seeds nor those of any cereal can be formed. Boussingault found them cultivated in South America, at an elevation having a mean heat as low as forty-nine degrees, requiring eleven months in which to grow, or three hundred and thirty-five days between the planting and digging. In many parts of this country, persons begin to dig potatoes in seventy days from the planting; and potatoes planted the first of May will be ripe by the first of August. In some of the Southern States they grow best in the winter season. Winter barley and rye will mature their seeds at a lower temperature than wheat. Humboldt found at Jakoustk, in high-central Asia, where the earth was constantly frozen at the depth of three feet below the surface, both rye and wheat yielding a return sometimes of fifteen to one of seed. At that place, the mercury is frozen two months in the year, the cold being over seventy-two degrees below freezing. Short as the summers are, they have a mean temperature of sixty-four degrees.

On the northern slope of Monte Rosa, in Switzerland, barley ceases to grow at an elevation of four thousand two hundred and sixty feet above the sea; on the southern side, it continues to be cultivated at the height of about six thousand five hundred and sixty feet. Boussingault says that the difference is ascribed to local causes.

In studying the mean temperature and annual fall of rain, including snow and dew, in the United States, and the distribution of both heat and water through the year, one can hardly escape the conviction that no other equal area on the globe has equal agricultural capabilities. Without including Delaware, there are within a fraction of six hundred million acres in the Southern States. On two-thirds of this vast surface, wheat is harvested early enough in May and June to permit a crop of corn to mature before autumn frosts. By drawing a line from the Atlantic due west to the Rio Grande, so as to have three hundred million acres south of it, on every arable acre two crops

* Humboldt, vol. v. p. 173.

of this most valuable of breadstuffs can be harvested in a year. Allowing one-third of this area for forests, the beds of rivers, and irreclaimable surface, and there is left two hundred million acres for cultivation. On the supposition that the south had a population adequate to demand such crops, one hundred million acres might be drilled with seed wheat in November, after corn harvest, putting half the needful fertilizers in with the seed, and sowing the balance broadcast in February or March, after the English and Belgian practice. With skillful culture and feeding, an average return of twenty bushels might reasonably be expected, producing an aggregate crop of two thousand millions of bushels. This crop would be harvested between the 10th of May and 15th of June, after which a crop of corn may be grown. With a dense population, as in Belgium, France, and many parts of China, there can never be a real lack of fertilizers; so that sixty bushels of corn can be produced on every acre of arable surface in our thirty States. By this estimate, it is seen that the same land which had produced two thousand million bushels of wheat might, so far as the *climate* is concerned, easily yield six thousand million bushels of corn, in season to seed with wheat again in autumn. Of the other one hundred million acres of arable soil, one-half may be planted in cotton and enriched no more than to give an average of a bale of four hundred pounds to the acre. This will secure an annual crop twenty times larger than is now grown in the United States, and fifteen times larger than the consumption of the whole human family. There will still remain fifty million acres adapted to the culture of sugar-cane, rice, tobacco, and other important staples.

The United States possess a territory embracing over two thousand millions of acres, more than a moiety of which is arable land, and a climate whose mean temperature, and fall of rain greatly favor the production of human food and clothing.

As we are now engaged in laying the foundation of an empire such as the world has never seen, nor scarcely conceived possible, every advantage of soil, climate, natural products, and such valuable trees for timber, fruit and fuel, as may be profitably cultivated, should command universal care and attention.

The following meteorological tables and statistics are compiled from the accounts received at this office, and contain valuable information as to the temperature, fall of rain, &c., in various parts of the United States.

Mean annual depth of Rain for four years.

(From records of the Smithsonian Institution.)

	Inches.
Fort Constitution, N. H.	28.85
Watertown Arsenal, Mass.	39.69
Fort Hamilton, N. Y.	45.71
Hancock Barracks, N. Y.	36.92
Watervleit Arsenal, N. Y.	34.22
West Point, N. Y.	48.70
Alleghany Arsenal, Penna.	28.14
Dearborn Arsenal, Mich.	31.30
Fort Brady, "	31.89
" Howard, "	38.83
" Winnebago, "	31.88
" Snelling, Iowa.	30.32
" Crawford, Wis.	29.54

	Inches.
Fort Leavenworth, Mo.	32.68
St. Louis Arsenal, Mo.	24.12
Fort Smith, Ark.	35.64
" Gibson, "	30.64
" Towson, "	46.73
New Orleans Barracks, La.	51.85
Fort Wood, La.	47.90
Key West, Florida,	31.39
Charleston, S. C.	33.89
Fort Monroe, Va.	52.53
" McHenry, Md.	40.80
Washington City, D. C.	34.62
Baltimore (8 years),	39.90
Boston (22 years),	39.23
Hanover, N. H.	38.00
State of New York,	36.00
State of Ohio,	36.00

Harvard Observatory, Cambridge, Mass., *Jan.* 18*th*, 1850.

Dear Sir—Yours of the 15th instant I received yesterday. In answer to your inquiries, I enclose the mean temperature of the external air at this place, for each month from 1842 to 1849 inclusive.

	1842	1843	1844	1845	1846	1847	1848	1849
	Fahr.							
January,	27°.1	29°.6	15°.3	27°.2	27°.4	26°.4	29°.1	24°.6
February,	31.6	16.5	24.6	27.6	21.3	25.9	24.7	18.2
March,	37.4	25.7	33.8	36.2	38.2	30.8	32.2	35.8
April,	44.4	43.5	48.4	46.3	49.5	42.0	45.5	45.3
May,	51.7	54.5	57.3	56.6	55.8	53.3	57.8	52.6
June,	62.6	64.2	65.1	68.1	65.0	64.7	64.8	67.7
July,	72.7	69.2	68.2	72.1	71.6	73.0	70.2	71.6
August,	67.5	69.9	67.7	71.3	70.2	68.1	69.5	70.9
September,	58.2	60.6	64.0	60.2	67.7	60.9	58.6	60.0
October,	48.1	47.3	45.5	51.8	51.2	47.7	49.8	49.2
November,	34.8	34.3	34.3	44.3	43.2	44.1	36.2	45.0
December,	23.8	26.9	26.6	25.6	27.4	34.8	35.2	28.9

Respectfully and sincerely yours,
WM. CRANCH BOND.

Daniel Lee, M. D.,
Patent Office, Washington.

Yale College Library, New Haven, Conn., *Jan.* 24*th*, 1850.

Sir—Your letter of the 15th inst. with inquiries respecting the mean temperature of New Haven, was duly received, but as a reply to the second query could not be given without some reduction of the original calculations (which were made for the Connecticut Academy of Arts and Sciences, at New Haven), I have been obliged on account of pressing engagements to delay a few days.

The mean temperature of the year at this place is 49° Fahr. very nearly. Taking four years at random, I find the mean temperature for the six months from April to Sept., each inclusive, to be,

at sunrise, 55°.74 Fahr.;
1 and 2 P. M., 71°.44;
10 P. M., 60°.91.

A larger range of years would probably make a little change in the figures; but these results are perhaps exact enough for your purpose.

Respectfully your obedient servant,
EDWARD C. HERRICK.

Dr. D. Lee,
Agricultural Rooms, Washington.

Collegiate Institute, Rochester, N. Y., *Jan.* 19*th*, 1850.

The annual mean temperature of the year 1849 at Rochester is 46°.48 Fahr.

The mean for the six months from April to Sept. inclusive, is 60°.14. The total fall of rain and melted snow for the year, as above, $32\frac{87}{100}$ inches. For the six months, as above, $18\frac{5}{10}$ inches—distributed as follows: April 1.44; May 3.81; June 4.33; July 0.94; August 3.62; September 3.91.

Total number of fair days during the year, one hundred and sixty-two.

Number of cloudy days during the year . . .	203
" " fair days during the six months as above .	110½
" " cloudy " " " " . .	72½
Highest range of the mercury, 95° . . .	July 10th.
Lowest " " " 9° below zero, .	Jan. 12th.

Respectfully yours,
L. WETHERELL.

Abstract of a Meteorological Journal for 1849. At Penn Yan, Yates Co., N. Y. North Lat. 42°42′. Lon. west from Washington, 0°51′. By H. P. Sartwell, M. D.

Warmest day in the year	July 12th, 90°
Coldest " "	Feb. 15th, 15°
First autumnal frost	Oct. 2d.
First fall of snow	Nov. 22d.

	Mean temperature.	Maximum.	Minimum.	Monthly range.	Warmest day.	Coldest day.	Prevailing winds.	Rain and melted Snow.	General character of the month.
								Inches.	
January,	22°.12	52°	- 4°	56°	25th	10th	W. S & NE	.57	Pleasant for winter.
February,	21.14	50	-13	63	28th	15th	W. SW & S	.54	Windy, unpleasant.
March,	33.64	62	6	56	21st	4th	N. S. W	.85	Cloudy, disagreeable.
April,	40.96	70	17	53	7th	16th	W & S	.48	Dry and raw.
May,	52.22	86	27	59	22d	2d	S & W	3.12	Wet, unpleasant.
June,	64.63	88	40	48	21st	9th	S. SW & W	2.20	Pleasant.
July,	66.77	90	39	51	12th	2d	S & W	1.60	Hot and dry.
August,	67.22	86	50	36	5th	1st	S. SW & W	1.69	Hot and dry.
September,	58.60	82	39	43	14th	9th	W & SW	1.37	Warm and pleasant.
October,	46.66	67	21	46	16th	31st	W. SW & S	6.29	Wet and chilly.
November,	44.66	66	26	40	5th	29th	S. SW & W	2.88	Raw, disagreeable.
December,	27.25	42	- 2	44	20th	25th	W. NW & N	1.38	Cloudy, unpleasant.

Total fall of rain 22.97 inches.
Annual mean temperature 45°.46.

Meteorological Observations made at the New York Hospital for the year 1849. By John Darcey.

1849	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	
Barometer.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	
Maximum	29.65	30.57	30.40	30.27	30.44	30.28	30.22	30.15	30.36	30.25	30.24	30.44	
Minimum	29.51	29.65	29.43	29.16	29.53	29.69	29.72	29.73	29.57	29.30	29.53	29.60	
Mean	30.28	30.04	29.97	29.84	29.97	29.98	30.04	29.99	30.00	29.88	29.93	29.97	
Thermometer.													
Monthly mean	28°	27°	40°	45°	55°	70°	70°	72°	64°	53°	49°	33°	
Highest	52	47	68	66	78	91	94	82	79	67	67	50	
Lowest	4	7	27	26	40	55	55	60	51	39	32	9	
Range	48	40	41	40	38	36	39	28	28	28	34	41	
Warmest day	26	24	31	4	4	22	13	7	17	17	4	1	Total.
Coldest day	11	19	4	15	6	12	31	1	9	31	2	26	
Fair days	10	6	9	11	6	13	11	9	15	5	7	7	109
Cloudy days	3	6	2	3	7	4	8	9	7	8	9	6	72
Rain fell	8	1	10	6	16	8	8	11	7	14	9	7	102
Inches of rain and melted snow	.56	1.99	5.55	1.00	3.77	.79	3.08	5.58	.73	6.55	2.02	4.39	36.01

Meteorological Observations at Newark, N. J., 1849. *By W. A. Whitehead.*

	THERMOMETER.			WEATHER.				
	Highest daily mean.	Lowest daily mean.	Monthly mean.	Fair days.	Rainy days.	Snow.	Rain and melted snow.	Prevailing winds.
January	47°.50	6°.00	26°.33	18	6	2	.64	N.W.
February	37.12	11.88	24.82	15	5	9	2.69	S.W. and N.W.
March	59.25	28.00	40.17	16	12	3	4.85	N.W. and N.
April	57.00	30.50	47.20	19	5	—	.91	N.W. and W.
May	70.13	39.63	55.52	15	11	—	4.23	N.E. and S.E.
June	83.12	50.75	70.15	21	6	—	1.09	E. and W.
July	89.00	63.13	73.84	21	6	—	2.36	N.E. and S.E.
August	76.00	67.12	72.12	21	11	—	8.08	E. and S.E.
September	75.50	57.90	64.38	23	7	—	1.60	N.W., N., N.E.
October	60.38	41.50	53.12	14	10	—	6.93	N.W. and N.E.
November	61.62	33.50	49.65	16	8	—	2.18	N.W. and S.W.
December	44.38	12.50	33.25	18	8	8	4.47	N.W. and W.
Results.								
1849	63°.42	36°.71	50°.89	214	95	22	40.05	
1848	64.37	36.71	51.24	233	91	23	36.90	
1847	65.30	36.62	50.66	219	91	31	54.83	
1846	65.43	36.30	51.66	209	98	23	51.57	
1845	64.28	37.65	51.37	238	88	24	36.47	

The observations upon which the yearly results in the above table are based, extending over five consecutive years, afford reliable data for some general deductions respecting the climate at this place.

The highest stage of the mercury in the course of five years was $99\frac{3}{4}$°. The lowest was $2\frac{3}{4}$°—making the range $102\frac{1}{2}$°.

Abstract of Meteorological Register, kept for the Delaware County (Pa.) Institute of Science.

North Latitude 39° 55′ 18″. Longitude 1° 36′ 10″ east from Washington. Altitude above tide water 175 feet.

Months.	Thermometer. Highest.	Thermometer. Lowest.	Thermometer. Mean.	Barometer. Highest.	Barometer. Lowest.	Barometer. Mean.	Weather. Cloudy.	Weather. Fair.	Weather. Rain fell.	Weather. Snow fell.	Rain Guage. Inches.
December, 1848	65°.50	24°	42°.98	30.58	29.68	30.03	19	12	13	4	5.08
January, 1849	52.66	1.50	28.63	30.76	29.67	30.12	18	13	6		.81
February	46	−1.50	27.03	30.60	29.66	30.11	16	12	4	6	2.65
March	66	16	41.56	30.45	29.52	30.03	17	14	14		4.54
April	72	24	49.48	30.32	29.27	29.99	19	11	9	2	1.47
May	83.50	41	57.22	30.48	29.56	30.01	17	14	15		4.48
June	98	45	71.71	30.35	29.70	30.27	12	18	8		2.86
July	95	52	72.85	30.30	29.75	30.09	16	15	10		2.31
August	89	53	71.95	30.20	29.78	30.02	14	17	8		6.02
September	88	43	62.29	30.43	29.66	30.10	10	20	8		.48
October	73	33	53.11	30.30	29.42	30.00	19	12	12		8.65
November	68	29	49.72	30.31	29.52	29.99	15	15	7		2.50
Result			52.37			30.06	192	173	114	12	41.85

Annual Report of Temperature and Rain at Springdale, near Louisville, Ky.

	1848 October.	November.	December.	1849 January.	February.	March.	April.	May.	June.	July.	August.	September.	Annual mean.
Mean temperature	*Fahr.* 53°	38°	43°	33°	33°	49°	53°	63°	72°	72°	71°	65°	53°.8
Rain . . .	*Inches.* 2.46	4.75	10.90	5.53	3.06	4.08	2.23	4.29	4.65	4.07	2.78	1.01	49.81

Highest range of thermometer, June 27, 90°.
Lowest range of thermometer, February 19, 7° below zero.

Meteorological Table of Monthly Means, kept at Nightingale Hall, on Pedee River, S. C. By James Kelly.

Months.	Thermometer. Sunrise.	Thermometer. 2 P. M.	Thermometer. Sunset.	Weather. Rainy days.	Weather. Clear.	Weather. Overcast.	Weather. Variable.	Direction of wind. No. of days. N. W.	N.	N. E.	E.	S. E.	S.	S. W.	W.
January	41°	44°	45°	3	2	—	—	9	8	3	1	1	4	2	3
February	45½	49½	46	2	5	8	13	6	—	4	2	—	1	—	3
March	57½	62	61	5	3	8	15	2	2	2	7	4	6	2	6
April	67	72	69	2	2	5	21	2	2	7	5	1	—	5	5
May	71	79	74½	7	6	2	16	—	—	1	11	1	2	3	11
June	77½	83	78	6	1	2	21	—	—	—	8	—	6	4	6
July	77	79	78	19	—	—	—	—	—	3	2	1	4	10	4
August	78½	82	80	11	1	1	18	1	—	3	4	3	4	2	3
September	77½	77	75	10	1	—	—	4	—	9	7	1	—	1	—

Abstract of Meteorological Observations, for 1849, *at Columbia, S. C., Latitude* 34°. *By A. Fitch.*

Months.	Thermometer. Mean temperature. 7 A. M.	2 P. M.	9 P. M.	Hottest day.	Coldest day.	Weather. Fair.	Cloudy.	Rain.	Hazy.	Quantity of rain.	Prevailing weather.
	Fahr.									Inches.	
January	37°.08	51°	42°.16	15°	12°	17	10	4	0	1.	Fair
February	35.21	42.13	42.08	5	19	18	7	1	2	1.12	"
March	50.09	65.04	55.	21	4	20	6	5	0	3.87	"
April	52.04	72.10	59.31	25	16	23	1	4	2	1.50	"
May	66.27	78.28	71.16	9	12	20	2	9	0	7.62	"
June	75.17	80.23	78.05	24	12	17	7	6	0	3.12	"
July	78.09	80.13	76.17	1	5	11	7	13	0	7.50	Rain
August	74.04	84.30	78.25	18	11	24	1	6	0	4.37	Fair
September	67.22	80.18	73.04	30	25	22	4	4	0	2.37	"
October	53.20	69.16	59.20	1	31	18	3	9	1	5.75	"
November	44.29	69.17	49.23	7	21	22	7	1	0	0.62	"
December	42.01	53.15	45.16	10	12	14	10	6	1	5.50	"
Total						226	65	68	6	44.34	

Extract from the Meteorological Journal, kept by the Young Ladies of the Oakland Institute, at Jackson, Miss. For the year ending November 30, 1849.

Months.	Thermometer. Least height.	Greatest height.	Mean for the month.	Rain. No. days.	Depth in inches.	Weather. Clear and pleasant days.	Damp and unpleasant days.
December, 1848	27°	79°	55°.02	11	8.11	14	17
January, 1849	26	78	51.09	6	2.74	13	18
February	14	78	46.50	4	.69	22	6
March	33	84	65.53	4	3.55	23	8
April	30	86	64.40	6	2.69	22	8
May	56	87	72.80	13	6.89	21	10
June	66	90	77.29	14	4.57	17	13
July	68	90	77.88	21	12.20	5	26
August	71	91	80.58	12	3.38	13	18
September	52	91	74.82	2	.32	27	3
October	34	86	63.64	4	6.25	24	7
November	33	79	58.17	6	9.54	23	7
Total				103	60.83	241	141

Mean height of thermometer, for the year, 65°.64.

Note.—The mean height of the thermometer is the mean of four observations daily. The "No. days' rain" includes every day on which rain fell, without regard to quantity. The "damp and unpleasant days" include many days that were only partially so.

Abstract of Meteorological Observations, near Washington, Arkansas. By N. D. Smith.

Months.	Thermometer. Highest.	Thermometer. Lowest.	Rain. 1849	1848	1847	1846	1845	1844	1843	1842	1841
			In.	In.	In.	In.	In.	In.	In.	In.	In.
January	72°	18°	8.62	3.	2.62	2.5	7.25	2.5	2.75	3.25	5.
February	78	6	5.62	2.5	6.75	4.	3.	2.87	1.5	3.62	.12
March	80	34	5.25	4.25	9.5	3.5	7.37	6.87	5.62	4.37	8.25
April	86	32	2.37	5.5	5.87	6.62	5.37	7.5	9.12	4.	5.
May	85	54	3.5	5.25	3.75	2.37	4.87	3.87	5.37	1.87	7.
June	90	60	2.62	8.62	3.87	4.12	6.75	4.75	3.62	5.5	4.75
July	91	70	18.5	6.5	5.29	3.25	2.5	1.12	2.62	1.62	1.25
August	94	68	3.87	2.87	7.25	1.	.25	1.12	3.	4.	2.75
September	90	56	1.37	1.	1.5	1.75	2.	4.5	6.87	1.5	4-5
October	84	38	3.	2.75	1.	2.75	6.92	4.12	6.75	2·62	8.5
November	80	34	4.62	6.75	5.25	2.25	1.	2.5	10.	2.62	2.37
December				9.5	4.12	3.75	4.12	1.5	3.37	5.12	2.75
Total				58.5	56.75	37.87	50.75	43.25	60.62	40.12	52.25

Meteorological Observations at Fort Madison, Iowa. By D. McCready.

1849	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Yearly mean.
Mean temperature	16°.56	21°.31	40°.36	49°.79	59°.37	74°.26	73°.56	71°.59	66°.94	52°.28	47°.54	21°.94	49°.62
													Total.
Fall of water		1.50	11.05	5.47	2.90	3.32	.70	10.91	7.80	3.30	8.15	.10	55.20
Fall of snow	12.	2.50										6.	20.50

The coldest day during the year was the 18th of February; the lowest range of the thermometer on that day being 18° below zero—the daily mean 6°.33 below zero.

The warmest day was the 9th of July—at 2 o'clock, 100° in the shade.

IV.

SECOND REPORT ON THE BREADSTUFFS OF THE UNITED STATES, MADE TO THE COMMISSIONER OF PATENTS, BY LEWIS C. BECK, M.D.

RUTGERS COLLEGE, NEW BRUNSWICK, N. J., *January* 1*st*, 1850.

SIR:—I beg leave to lay before you the results of my researches in regard to the breadstuffs of the United States, since the date of my former report made to the Hon. Edmund Burke, on the 15th of December, 1848. In that report I have given a full account of the objects of the investigation, and the modes adopted in its prosecution. There is little difference of opinion concerning the importance of our breadstuffs; but there is still, it seems, a want of general information as to the causes which have an influence upon their value. Among these the most important undoubtedly is carelessness in the shipment from the interior to our commercial depots, and from thence to foreign ports. It is to this point that my attention has been particularly directed, as one of great utility; and the large number of samples of American wheat and wheat flour which have been received from England, have enabled me to arrive at some general conclusions upon the subject. The analyses of several samples, the growth of various foreign countries, have also afforded me an opportunity of comparing the American and foreign wheats and flours. With a few exceptions of peculiar varieties, it will be seen from the results that with ordinary care the wheat of this country will compare advantageously with that of any other. Indeed, on reviewing my analyses, I question whether there is any part of the world where this grain is generally of a finer quality than it is in the United States. But all the advantages which we possess in this respect will be of little avail so long as inferior and damaged breadstuffs are shipped from our ports.

In addition to the analyses which I have executed of the various samples of wheat and wheat flour according to the mode heretofore pursued, I have performed a series of experiments for the purpose of settling the important question in regard to the relative value of the fine flour of wheat, and the "whole meal." I have also consulted every work within my reach which could throw any light upon the different points that have presented themselves during the progress of the investigation.

The large number of samples of wheat and wheat flour which have been placed in my hands for examination, have left me no time for the analysis of our other breadstuffs. I trust you will excuse me for saying that I have at least not been wanting in industry. Notwithstanding the depressing influences which during the past season were so general, I have prosecuted my researches with little interruption. Whether these researches shall be continued, and whether they shall be continued under my direction, are

questions, the decision of which must be left to your appreciation of their importance and of the manner in which they have thus far been conducted.

I have the honor to be

Your obedient servant,

LEWIS C. BECK.

Hon. Thomas Ewbank,

Commissioner of Patents, Washington City.

REPORT.

General Remarks upon the value of our Breadstuffs.

The experience of the past year may perhaps have led many persons to suppose that the statements which I have heretofore made concerning the importance of our breadstuffs, in a commercial point of view, were too highly colored. It cannot be denied that the amount shipped to foreign ports during that period is considerably less than for the two preceding years. In the mean time, however, a new and important market has been opened in our own territories on the Pacific. It may also be safely affirmed that the causes for foreign demand, and which must hereafter operate, still remain. These are, the cheapness of land in this country, and the peculiar adaptation of our soil and climate to the growth of the two important cereals, wheat and maize.

Another fact, it seems to me, is of sufficient interest in connection with this subject, to be here noticed. The failure of the potato crop in various parts of the world for several years past has engaged the attention of scientific and practical men. Unfortunately, the nature of the blight which has seized upon this tuber has eluded the most careful inquiries; but it has been shown by well-conducted analyses that potatoes at their late prices are the most expensive kind of farinaceous food. This will be evident from the following statement:—

"Potatoes contain from about seventy to seventy-nine per cent. of water, while the proportion in wheat flour is from twelve to fourteen per cent. And while the gluten and albumen in potatoes scarcely rise to one per cent., in wheat flour the range may be set down at from nine to thirteen per cent. Again, the non-nitrogenous principles are as about seventy-five per cent. in wheat flour against fifteen or sixteen in potatoes. In short, whilst potatoes supply only twenty per cent. of heat-forming and nutritious principles, taken together, wheat supplies more than seventy per cent. of the former, and more than ten of the latter. The value of wheat to potatoes, therefore, is at least four to one: or, if wheat sells at fifteen shillings (sterling) per cwt., potatoes to be equally cheap ought to sell at between three and four shillings."

The preceding results, for which I am principally indebted to Dr. Daubeny, Professor of Chemistry at Oxford,* show that unless a great change occurs in the culture of the potato, there must be an increased demand for other kinds of farinaceous food. And it is worthy of notice that while this blight is one of the causes which bring to our shores the starving popula-

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* A lecture on the nutritive value of different articles of food, by C. Daubeny, M. D., "Gardeners' Chronicle" (London), January 20th, 1849, p. 37.

tion of Europe, the raising of the cereals not only furnishes profitable employment to the emigrant, but enables him to make the best return to those who are still obliged to remain.

Adaptation of the Soil and Climate of the United States to the Culture of the Cereals.

That the soil and climate of many portions of the United States are well adapted to the cultivation of the more important cereals, is fully shown by the results of all the researches which have thus far been prosecuted. I have indeed seen it asserted that the climate of England is the best for the cultivation of wheat, and preferable to any in our country; its humidity being the peculiarity to which this superiority is ascribed.* But this is undoubtedly the testimony of a too partial witness. A recent statement by an English author is the result of a more correct knowledge of the facts. He acknowledges that there is no ground for the expectation which has been entertained concerning the advantageous growth of maize in England. "Nor is ours," says he, "the most favorable country for wheat, but skill in husbandry has overcome great difficulties."† The mistake on this subject may have originated from the occurrence of a larger and plumper grain in the more humid climate; but analysis shows that the small grain raised in the hotter and drier air oftentimes greatly surpasses the former in its nutritive value.

Russia is said to be the great rival of this country in the growth of wheat, but I think it doubtful whether she possesses superior natural advantages; and I am sure she will find it difficult to compete with the industry and skill which here characterize the operations of husbandry, and the manufacture and shipment of breadstuffs.

Export of Sophisticated and Damaged Flour.

It is a matter of deep regret that circumstances have occurred which must have a most injurious influence upon the trade in breadstuffs between this country and Great Britain. I refer to the mixtures of damaged, inferior and good kinds of flour, which it appears on authentic testimony have been largely exported during the past year. Whether this fraudulent operation, which is said to have been principally confined to New York, is the result of the change in the inspection laws, as some assert, I am unable to say. But it requires no great foresight to predict that, if continued, it will create a distrust of our breadstuffs in foreign ports which it will be very difficult to remove. It cannot but excite the indignation of the many honorable dealers, that the unworthy cupidity of a few individuals should lead to such disastrous consequences.

I have as yet been unable to obtain samples of these sophisticated flours, and the only information which I have in regard to them is the general fact above stated, and concerning the truth of which there can be little doubt. No means should be left untried to devise some mode by which these frauds can be easily and certainly detected.

* Transactions of the New York State Agricultural Society, 1849, p. 646. The statement here referred to was made by Mr. Slocum.

† A lecture "On the Geographical Distribution of Corn Plants," by the Rev. E. Sidney—Proceedings of the Royal Institution (London), May 18th, 1849.

Injury sustained by Breadstuffs during their Transport and Shipment.

During the past year, I have had abundant means of determining the nature of the injuries which are often sustained by our breadstuffs in their transport from the particular districts in which they are grown and manufactured to our commercial depots, and in their shipment to foreign ports. As this is one of the most important points connected with these researches, I have devoted much time to its investigation. From the results of numerous analyses, I think it may be safely asserted, that of the wheat flour which arrives in England from various ports of the United States, a large proportion is more or less injured during the voyage. The same remark may be made in regard to many of the samples sent from the Western States to the city of New York. Their nutritive value is considerably impaired, and without more care than is usually exercised, they are entirely unfit for export.

In my former report, I adverted to one of the great causes of the deterioration which our breadstuffs often suffer during their transport and shipment. This was the undue proportion of the great disorganizing substance, water, under the influence of what usually occurs, viz., an elevation of temperature above the ordinary standard. My recent investigations have served only to strengthen these views. There is no doubt that these are the conditions which cause the change of the non-nitrogenous principles into acids (the lactic or acetic), while a portion of the gluten is thus also consumed.

I have tried a series of experiments in reference to the action of moisture upon various samples of wheat and wheat flour. The samples were placed for twelve hours in the oven of a bath with a double casing, containing a boiling saturated solution of common salt, the temperature of which was about 220° Fahr. Subjected to this test,

100 grains of	Milwaukie wheat lost		12.10	grains.
" "	Guilderland (Holland) wheat lost		9.35	"
" "	Polish Odessa red wheat	"	10.55	"
" "	Soft Russian wheat	"	8.55	"
" "	Kubanka wheat	"	8.15	"

After an exposure of the dried samples to the air for two or three days, they increased in weight from one to three grains in the hundred originally employed.

Nineteen different samples of wheat flour, which lost by exposure to the above heat from ten to fourteen grains in the one hundred, when similarly exposed to the air for eighteen hours, again increased in weight from 8.40 to 11.50 in the hundred grains originally employed.

These experiments show, what might indeed have been predicted as to the general result, that wheat in grain, if not less liable to injury than flour, yet if once properly dried, suffers much less from a subsequent exposure to air and moisture.

It is now ascertained that in presence of a considerable proportion of water, wheat flour under the influence of heat undergoes a low degree at least of lactic fermentation; which will account for the *souring* of the ordinary samples when exposed to warm or humid climates. The same result will inevitably follow from their careless exposure in the holds of vessels. That this is particularly the case with many of the cargoes of wheat flour shipped to Great Britain, there is little reason to doubt. This may be partly owing to the great humidity of the English climate, as the deterioration is observed as well in the flour which is the produce of that country as in that which is received from abroad.

It is stated by Mr. Edlin, quoted in an article on Baking, in the *Encyclopædia Britannica*, that, "as a general rule, the London flour is decidedly bad. The gluten generally wants the adhesiveness which characterizes the gluten of good wheat."

I have observed that, in the analyses of some of the samples of damaged flour, the proportions of what is set down under the heads of glucose and dextrine are unusually large. This is perhaps due to the change produced in the starch by the action of diastase, and which may under certain circumstances be formed in wheat flour. It would seem, according to M. Guérin, that starch may thus be acted on even at slightly elevated temperatures. In one of his experiments, at a temperature no higher than 68° Fahr., a quantity of starch, at the end of twenty-four hours, was converted into syrup, which yielded seventy-seven per cent. of saccharine matter.*

It may be thought that I have overrated the importance of this subject, but it is believed that a careful examination of the facts will relieve me from this charge. I am now satisfied that, if the proportion of water in our exported breadstuffs could be reduced to about five or six per cent., one of the great causes of complaint in regard to them would be completely removed.

Kiln-drying of Breadstuffs, and exclusion of air.

The injury which our breadstuffs sustain by the large proportion of water can of course be prevented only by careful drying before shipment, and by the employment of barrels rendered as impervious as possible to the influence of atmospheric moisture.

In my first report, I have spoken favorably of the process of drying by steam, according to the plan patented by Mr. J. R. Stafford. I still think this mode possesses great advantages over those previously followed, and which almost always injured the quality of the grain or flour: but from some trials which I have made during the past year, it is inferred that the exposure to the heat is perhaps usually not sufficiently prolonged to answer the purpose intended by the operation. I have often observed that samples of wheat flour, after being exposed to the heat of the salt water-bath oven (220° Fahr.) for two or three hours, lost weight by a further continuance of the heat. An apparatus has been patented by Mr. J. H. Tower, of Clinton, N. Y., consisting of a cylinder of square apartments or tubes, into which the grain or flour is introduced, and subjected to heat while in rapid revolution. I examined samples which had been subjected to this operation, and ascertained that wheat flour, originally containing 14.80 per cent. of water, had the proportion reduced to 10.25 per cent., while in wheat the proportion of water was reduced from 14.75 to 8.55 per cent.

Now it is probable that by either of the above modes, and perhaps by many others, the various kinds of breadstuffs may be brought to that degree of dryness which, with ordinary care, shall protect them from subsequent injury; but in order to secure this advantage, the operation must be carefully performed, and experiments must be made to ascertain how long an exposure to heat is necessary to bring the sample to the proper degree of dryness, and to determine whether in any respect its quality is impaired. It has already been stated that absolute desiccation is not necessary, even were it attainable; but any process in order to be effective should reduce the proportion of water to about six, or at most, seven per cent.

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* Boussingault's Rural Economy, American edition, pp. 85 and 86.

I have heretofore adverted to the great care employed in the drying of grain in various foreign countries, and to which the preservation of it for a great number of years is to be ascribed.

The operation is not conducted in the hurried manner which is here thought to be so essential, but is continued long enough to effect the intended object. Thorough ventilation, as well as the proper degree of drying, and which is equally important, is thus secured.

It is said that in Russia the sheaves of wheat, carried into the huts, are suspended upon poles and dried by the heat of the oven. The grain shrinks very much during this process, but it is supposed to be less liable to the attacks of insects, and preserves its nutritive qualities for many years. During the winter, it is sent to market.*

With all the necessary attention which may be paid to the proper drying of our breadstuffs intended for export, another point is of equal importance, viz., the shipment in vessels rendered as impervious as possible to the influence of atmospheric moisture. For however carefully and thoroughly the drying, especially of wheat flour or maize meal, may have been performed, it will be nearly useless if the shipment is afterwards made in the barrels commonly employed.† And it is very certain that the transport and shipment of grain in bulk, as usually conducted, are attended with great loss. This difficulty might be removed at a trifling expense by adopting the plan suggested in the preceding report, and to which I would again respectfully call the attention of those who are engaged in this branch of trade.

I might here adduce a mass of testimony showing the importance of the matters just referred to, but will only advert to the following statements, which, although made in allusion principally to maize, are equally applicable to our other breadstuffs. Maize meal, if kept too long, "is liable to become rancid, and it is then more or less unfit for use. In the shipments made to the West Indies, the meal is commonly kiln-dried, to obviate as much as possible this tendency to rancidity." "When ground very fine, maize meal suffers a change by exposure to the air. It is oxygenated. It is upon the same principle that the juice of an apple, after a little exposure to the air, is oxygenated, and changes its character and taste. If the flour could be bolted *in vacuo*, it would not be changed." "Intelligent writers speak of the necessity of preparing corn for exportation by kiln-drying as indispensable. Without that process, corn is very liable to become heated and musty, so as to be unfit for food for either man or beast. The kiln-dried maize meal from the Brandywine Mills, &c., made from the yellow corn, has almost monopolized the West India trade. This process is indispensable, if we export maize to Europe. James Candy says that from fifty years experience he has learned the necessity of this process with corn intended for exportation." "I have often found the corn from our country when it reached its destination, ruined by heating on the voyage. It had become musty and of little or no value. Kiln-drying is absolutely necessary to preserve it for exportation. We must learn and practice the best mode of kiln-drying it.‡

* The Czar, his Court and People. By John S. Maxwell, p. 272.

† Zenas Coffin, one of the oldest whalemen in Nantucket, states that corn meal in tight rum puncheons when sent to the West Indies, will keep sweet, while in common flour barrels it will spoil. Report of the Commissioner of Patents for 1847, p. 133.

‡ From remarks of Col. Skinner, and others, at a meeting of the American Institute, held in April 1846. Transactions of American Institute, 1846, p. 509 *et seq.*

The Nutritious Value of the "whole meal" of Wheat, as compared with that of the Fine Flour.

The question, whether what is called the whole meal of wheat, or that which is obtained by the mixture of the bran, contains more nutritious matter than the fine flour, is one of great importance. In my former report, I adverted to the statement made in regard to it by Professor J. F. W. Johnston, and which seemed to be almost conclusive in favor of the superior value of the whole meal. During the past year, however (1849), M. Eng. Peligot, an eminent French chemist, in an elaborate article "On the Composition of Wheat," to which more particular reference will be made hereafter, combats the opinion that the bran is an alimentary substance. He observes that "the difficulty of keeping the bran in flour intended for the manufacture of bread of good quality, appears to result much less from the presence of the proportion of cellulose (one of the constituents of woody matter) contained in wheat than that of the fatty matter. This is found in the bran in a quantity at least triple of that which remains in the flour, and the bolting separates it from the ground wheat not less usefully than the cellulose itself."*

M. Millon objects entirely to the views of M. Peligot on this point, and states some facts which are especially worthy of consideration. He asserts that, according to the views of the last-named chemist, the separation at most of one part of fatty matter sacrifices fifteen, twenty, and even twenty-five per cent. of substances which are of the highest nutritive value. This abstracts from wheat, for the whole amount raised in France, the enormous sum of about two hundred millions of pounds annually.

It seems that in France the question whether the bolting of flour is advantageous has always been decided in the most arbitrary manner. An ordinance of Louis XIV., issued in 1658, prohibited, under a very heavy penalty, the regrinding of the bran and its mixture with the flour; this, with the mode of grinding then in use, caused a loss of more than forty per cent.†

In large cities and elsewhere, there seems for some time to have been a growing prejudice against the use of brown bread; and it is said that now nearly all the peasantry of France bolt their flour. The increase of this practice, according to M. Millon, threatens the nation with an annual loss of from two to three hundred millions of francs. If the bran was entirely valueless, there would be a loss of more than one million a-day.‡

It is quite difficult to determine the precise amount of bran which may have been removed from wheat, for various samples contain such a different proportion of bran that in the one case a removal of ten per cent. leaves more bran in the flour than a bolting of five per cent. in another.

The following are the results of an analysis of bran by M. Millon; the sample being from a soft French wheat grown in 1848:—

Starch, dextrine and sugar,	53.00
Sugar of liquorice,	1.00
Gluten,	14.90
Fatty matter,	3.60
Woody matter,	9.70
Salts,	.50
Water,	13.90
Incrusting matter and aromatic principles (by difference),	3.40
	100.00

* Comptes Rendus des Séances de L'Académie des Sciences, February 5th, 1849.
† Comptes Rendus, February 19th, 1849. ‡ Ibid.

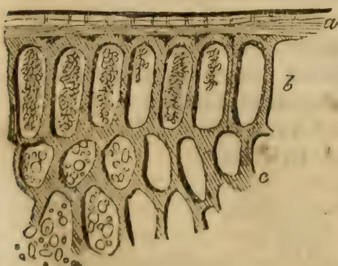
The conclusion to be drawn from this analysis is, that bran is an alimentary substance. If it contains six per cent. more of woody matter than the rough flour, it has also more gluten, double that of fatty matter, besides two aromatic principles which have the perfume of honey, and both of which are wanting in the fine flour. Thus by bolting, wheat is impoverished in its most valuable principles, merely to remove a few hundredths of woody matter.

The economical suggestion which springs from these views is, that the bran and coarse flour should be reground and then mixed with the fine flour. Millon states that he has ascertained, by repeated experiments, that bread thus made is of superior quality, easily worked, and not subject to the inconvenience of bread manufactured from the rough flour, such as is made in some places, and especially in Belgium.

Opinions similar to those above noticed are entertained by Professor Daubeny. "The great importance attached to having bread perfectly white is a prejudice," says he, "which leads to the rejection of a very wholesome part of the food, and one which, although not digestible alone, is sufficiently so in that state of admixture with the flour in which nature has prepared it for our use." After quoting the remarks of Professor Johnston on the same side of the question, he adds, "that according to the experiments of Magendie, animals fed upon fine flour died in a few weeks, whilst they thrived upon the whole meal bread." Brown bread, therefore, should be adopted, not merely on a principle of economy, but also as providing more of those ingredients which are perhaps deficient in the finer parts of the flour.*

The remarks of Dr. Robertson may also be here introduced. "The advantage," says he, "of using more or less of the coverings of the grain in the preparation of bread has often been urged on economical principles. There can be no doubt that a very large proportion of nutritive matter is contained in the bran and the pollard; and these are estimated to contain about one-fifth part of the entire weight of the wheat grain. It is, unquestionably, so far wasteful to remove these altogether from the flour; and in the case of the majority of people, this waste may be unnecessary, even on score of digestibility."†

Fig. 1.



This subject can also be rendered apparent to the eye. If we make a cross section of a grain of wheat, or rye, and place it under the microscope, we perceive very distinct layers in it as we examine from without inwards. The outer of them belong to the husk of the fruit and seed (*a*, in the annexed cut), and are separated as bran, in grinding. But the millstone does not separate so exactly as the eye may by means of the microscope, not even as accurately as the knife of the vegetable anatomist, and thus with the bran is removed also the whole outer layer of the cells of the nucleus, and even some of the subjacent layers. A glance at the figure shows, how-

* Gardeners' Chronicle (London). January 27th, 1849, p. 53.
† A Treatise on Diet and Regimen, by Wm. Henry Robertson, M. D., vol. i. p. 153.

ever, at once, that the contents of the outer cells of the nucleus (*b*) are very different from those of the inner (*c*); for while the latter enclose a great quantity of starch and very little nitrogenous matter, in the outer layer of cells we find only the latter substance, which in the cereal grains usually receives the name of gluten. Thus the anatomical investigations of one of these corn grains at once explains why bread is so much the less nutritious, the more carefully the bran has been separated from the meal.*

There can therefore be little doubt that the removal of the bran is a serious injury to the flour; and I have presented the above array of evidence on this point in the hope of directing public attention to it here, as has been done in various foreign countries.

After this, it will easily be inferred that I am not disposed to look with much favor upon the plan proposed by Mr. Bentz for taking the outer coating or bran from wheat and other grains previously to grinding.† Independently of the considerations which have already been presented, it is far from being proved, as this gentleman asserts, that the mixture of the bran with the meal which results from the common mode of grinding is the chief cause of the *souring* of the flour in hot climates. On the contrary, the bran is perhaps as little liable to undergo change as the fine flour, and then the moistening to which, as I am informed, the grain is subjected previously to the removal of the husk, is still further objectionable, and must be followed by a most carefully conducted process of kiln-drying.

Nutritious Properties of various articles of Food.

There seems to be some difference of opinion in regard to the nutritious properties of various kinds of food. It is generally, however, agreed that those which contain the largest proportion of nitrogenous matters are the most nutritious. It is on this account that haricots, peas and beans, form, in some sort, substitutes for animal food. Tubers, roots, and even the seeds of the cereal grasses, are but moderately nutritious. If we see herbivorous animals fattening upon such articles, it is because, from their peculiar organization, they can consume them in large quantities. It is quite doubtful whether a man doing hard work could exist on bread exclusively. The instances which are given of countries where rice and potatoes form the sole articles of food of the inhabitants, are believed to be incomplete. Boussingault states that in Alsace, for example, the peasantry always associate their potato dish with a large quantity of sour or curdled milk; in Ireland with buttermilk. "The Indians of the Upper Andes do not by any means live on potatoes alone, as some travelers have said they do: at Quito, the daily food of the inhabitants is *lorco*, a compound of potatoes and a large quantity of cheese. Rice is often cited as one of the most nourishing articles of diet. I am satisfied, however, after having lived in countries where rice is largely consumed, that it is anything but a substantial, or, for its bulk, nutritious article of sustenance."‡ These statements are further confirmed by the observations of M. Lequerri, who, during a long residence in India,

* The Plant: a Biography; by M. J. Schleiden, M. D., Professor of Botany in the University of Jena. English translation, p. 54.

† Transactions of the New York State Agricultural Society for 1847, p. 190. In this communication, Mr. Bentz does not describe the process which he adopts, but enumerates some of its supposed advantages.

‡ Rural Economy, Amer. edition, p. 409.

paid particular attention to the manners and customs of the inhabitants of Pondicherri. "The food," says he, "is almost entirely vegetable, and rice is the staple; the inferior castes only ever eat meat. But all eat *kari*, an article prepared with meat, fish, or vegetable, which is mixed with the rice, boiled in very little water. It is requisite to have seen the Indians at their meals to have any idea of the enormous quantity of rice which they will put into their stomachs. No European could cram so much at a time; and they very commonly allow that rice alone will not nourish them. They very generally still eat a quantity of bread."*

In regard to the proportion of nutritious matter contained in grains of various kinds, it may be remarked that the tables which have been constructed as the results of various experiments are liable to an objection, which will be more particularly adverted to under another head. For example, two substances, by the process of ultimate analysis, may exhibit the same proportion of nitrogenous matter, and still differ very materially in their value as articles of food. Much depends on the digestibility of the form in which this matter is presented to the digestive organs. A strong illustration is afforded in the case of hay, the proportion of nutritive matter of which, about 9.71, would certainly not represent its power of affording nourishment to the human system. It is in truth quite impossible to arrive at any other than approximative results from the operations of chemistry, as to the amount of nutriment contained in a given quantity or weight of any article of food.†

It is perhaps not irrelevant to notice in this place some of the researches which have recently been made upon fermentation, and particularly its effects in the manufacture of bread. It appears that when this process is brought about by the addition of yeast or leaven to the paste or dough, the character of the mass is materially altered. A larger or smaller proportion of the flour is virtually lost. According to Dr. William Gregory, the loss amounts to the very large proportion of one-sixteenth part of the whole of the flour. He says, "To avoid this loss, bread is now raised by means of carbonate of soda, or ammonia and a diluted acid, which are added to the dough, and the effect is perfectly satisfactory. Equally good or better bread is obtained, and the quantity of flour which will yield fifteen hundred loaves by fermentation, furnishes sixteen hundred by the new method, the sugar and fibrin (gluten) being saved."‡

Another author, Dr. R. D. Thomson, states, as the result of his experiments upon bread produced by the action of hydrochloric acid upon carbonate of soda, "that in a sack of flour there was a difference in favor of the unfermented bread to the amount of thirty lbs. thirteen ounces, or in round numbers, a sack of flour would produce one hundred and seven loaves of unfermented bread, and only one hundred loaves of fermented bread of the same weight. Hence it appears that in the sack of flour by the common process of baking, seven loaves, or six and a half per cent. of the flour, are driven into the air and lost."§

The only objection to the general introduction of this process seems to be the degree of care and accuracy required in properly adjusting the respective qualities and quantities of acid and alkali, and which could sel-

* Quoted by Boussingault, Rural Economy, Amer. edition, p. 410.
† A Treatise on Diet and Regimen, by Wm. Henry Robertson, M. D., vol. i. p. 140.
‡ Outlines of Chemistry, p. 352.
§ Experimental Researches on the Food of Animals, &c., p. 183.

dom be attained even by those who are largely engaged in the manufacture of bread.

I cannot leave this subject without adverting to a practice which has prevailed in England and France, and perhaps also in this country, of steeping wheat before sowing it in solutions of arsenic, sulphate of copper, and other poisonous preparations.

The result has been that injurious effects have often followed both to those who are employed in sowing such grain, and to those who have used the bread manufactured from it. The great importance of the subject led to the appointment of a commission at Rouen, in France, in December, 1842, having for its object to determine the best process of preventing the smut in wheat, and to ascertain whether other means less dangerous than those above noticed were productive of equally good results. The labors of this commission extended over the years 1843–'44–'45, and the experiments were repeated two years following on the farm of Mr. Fauchet, one of the commission, at Boisquilaume, in the department of the Seine Inferieure.

The results arrived at by this commission are—1st. That it is not best to sow seed without steeping. 2d. That it is best to make use of the sulphate of soda and lime process, inasmuch as it is more simple and economical, in no way injurious to the health, and yields the soundest and most productive wheat. 3d. That the use of arsenic, sulphate of copper, verdigris, and other poisonous preparations, should be interdicted by the government.*

Composition of Wheat and Wheat Flour, and the various modes of determining their Nutritive Value.

In my former report, it was stated that the analyses of the various samples of wheat, the results of which were there given, had been chiefly directed to the determining the amount of rough *gluten* which they contained. My reasons for adopting this plan and the arguments in favor of its general accuracy as compared with other modes of analysis, and especially that by which the ultimate composition is ascertained, were also detailed. A more full examination of this subject has served only to strengthen the opinion already expressed, that for the great purpose to be answered by these researches, the process which I have adopted is, to say the least, as free from objection as any other, and if carefully and uniformly carried out, will truly represent the relative values of the several samples of wheat flour. As this is a matter of much consequence in a practical point of view, I trust I shall be excused for introducing some additional facts in regard to it.

The term *gluten* was originally applied to the gray, viscid, tenacious and elastic matter which is obtained by subjecting wheat flour to the continuous action of a current of water. But it appears that this is a mixture of fibrine and caseine, with what is now called *glutine*, and a peculiar oily or fatty matter. Now these substances may be separated from each other, but the processes employed for this purpose are tedious, and to insure accuracy the various solvents must be entirely pure—a point which, especially in the case of alcohol and ether, is not ordinarily easy to be attained. This will be rendered still more evident by a reference to a French process which will hereafter be noticed.

But were it much less difficult in every case accurately to separate the

* Gardeners' Chronicle (London), January 6th, 1849, pp. 10 and 11.

constituents of gluten, it would not in my opinion be of the least practical utility. It is to the peculiar mechanical property of this gluten that wheat flour owes its superior power of detaining the carbonic acid engendered by fermentation, and thus communicating to it the vesicular spongy structure so characteristic of good bread.* It may also be added, that the results of more than one hundred trials have satisfied me that a diminution or loss of elasticity in the gluten is the surest index of the amount of injury which the sample of flour has sustained. Whether, therefore, the sample contains a certain proportion of nitrogen, or whether it contains albumen, fibrine and caseine in sufficient quantity, it may still want the very condition which is essential to the manufacture of good bread. My objection, therefore, to the mere determination, however accurate, of the proportion of nitrogen contained in wheat flour, or of the various principles which form the gluten, is that it does not represent the value of the various samples for the only use to which they are applied, viz.—the making of bread. The remarks of Mulder, the celebrated Dutch chemist, upon the subject of manures, are so applicable to this point, that I cannot refrain from quoting them. "It has," he says, "become almost a regular custom to determine the value of manures by the quantity of nitrogen they yield by ultimate analysis. This method is entirely erroneous; for it is based upon the false principle, that by putrefaction all nitrogenous substances are immediately converted into ammonia, carbonic acid, and water! But these changes sometimes require a number of years. Morphine, for example, is prepared by allowing opium to putrefy; and the process for preparing leucin, a substance which contains 10.72 of nitrogen, is to bring cheese into putrefaction. Cheese, therefore, does not perhaps in a number of years resolve itself into carbonic acid, ammonia, and water, but produces a crystalline substance, which contains no ammonia. Hence the proportion of nitrogen yielded by manures is not a proper measure of their value, and therefore this mode of estimating that value ought to be discontinued."†

We infer, therefore, that the proportion of nitrogen furnished by food of various kinds is not the true measure of their nutritious value, and cannot for practical purposes take the place of that process by which the amount of rough gluten is determined.

No better illustration can be given of the uncertainty which attends the inferences drawn from the ultimate composition, than the fact heretofore stated in regard to hay, the nutritive value of which is placed in the tables containing the results of these analyses, at a figure nearly the same as that of ordinary wheat flour.‡

In the paper on the "Composition of Wheat," by M. Peligot,§ to which I have already referred, the author gives the results of the various analyses which he has made, and details the process he adopted.

Aware of the complex and difficult nature of the examination as conducted by him, he seems to doubt in regard to some of the results given in his table. In the fourteen samples which he analyzed, the proportion of water ranges from 13.2 to 15.2, which is a rather higher average than is yielded by our

* Experimental Researches on the Food of Animals, &c., by R. D. Thomson, M. D., p. 156.

† Chemistry of Vegetable and Animal Physiology, translated by Prof. J. F. W. Johnston, p. 684.

‡ See Dr. R. D. Thomson's Experimental Researches on the Food of Animals, &c.

§ Comptes Rendus, February 5th, 1849.

American samples, especially those which have not been shipped across the Atlantic. Of the nitrogenous matter, soluble and insoluble, the proportions range from 9.90 per cent. to 21.50 per cent.; the former being from a sample of very soft and white French wheat; the latter from a very hard wheat with long grains, from Northern Africa, cultivated at Verriéres. Another sample from Egypt yielded 20.60 per cent. of these nitrogenous matters, both of which are very remarkable proportions.

In describing the process for ascertaining the amount of insoluble nitrogenous matters, this author adverts to their estimation either by the quantity of nitrogen gas furnished, or of ammonia formed, the last being preferred for substances, which, like wheat, contain only a few hundredths of nitrogen. The results which he obtained by this method were compared with those yielded by the direct extraction of the gluten by softening the farina under a small stream of water. "These results," says he, "differ but little from each other when we operate upon wheat in good condition, although the gluten which we thus obtain holds some starch and fatty matter, while the starch which is carried away by the water contains also some gluten." The loss and gain, as I have already explained, and as has been proved by these and other comparisons, are nearly balanced, and the amount of rough gluten will therefore afford a fair exhibit of that of the insoluble nitrogenous matters in this grain.

The salts in the samples of wheat analyzed by M. Peligot, were either wanting or were in small proportion; while the amount of fatty matter ranged from 1.00 to 1.80 and 1.90 per cent.

These results agree very well with those which I have obtained. But it is probable that the proportion is liable to great variation, inasmuch as it is inferred that the fatty matter originates from starch through its exposure to the general deoxidizing influence which prevails in plants.*

There are also many difficulties attending the accurate determination of this matter, and which are probably the cause of the higher proportion often given. It is properly remarked by M. Peligot that the ether employed in this process should be free from water, and that the flour ought also to be very dry. By neglecting these precautions, we separate not only the fatty matter, but also a certain amount of matters soluble in the water, which is furnished as well by the wheat as by the ether.

It would not, I think, be difficult to point out some incorrect views entertained by this chemist, and more especially those which relate to the fatty matter. Some of his processes for the separation of various substances, if not faulty, require so many conditions for success as to render the results, at least in other hands, exceedingly uncertain.

But the capital error which he has committed is that concerning the bran, already adverted to, which he considers injurious to the flour, chiefly in consequence of the large proportion of fatty matter which it contains.

In regard to the soluble nitrogenous matter usually called albumen, from its resemblance to the animal substance of the same name, I have to remark, that in my trials the proportion has been found to be considerably less than that often given in tables of the composition of wheat. In one sample it was found to be as low as 0.15 per cent., in another it did not rise above 0.20 per cent. The amount was usually so inconsiderable,

* Mulder's Chemistry of Vegetable and Animal Physiology; English translation, p. 816.

that I did not think it worth while to retard the progress of the work by following out processes which could add little to the utility of these investigations.

Although much time and labor have been expended upon the analyses of the ash of plants, I have but slight confidence in the results heretofore given. The difficulties which attend the obtaining the ash in a proper condition, and the fact that the products of all the organs and parts of the plants have been analyzed together, must necessarily impair the accuracy of the experiments, and render the inferences drawn from them of uncertain value. Much, indeed, I may say almost everything, still remains to be done in this department of agricultural chemistry.

Weight of Wheat as an Index to its Value.

Much has been said in regard to the relative weights of the bushel of wheat of different varieties or under different modes of culture.

As ordinarily determined, this weight ranges from fifty-six to sixty-five or sixty-six pounds, being in a few cases set down somewhat higher. It is said also that the bushel of wheat weighs less in some years than it does in others, and that the difference often amounts to two, or three, or even four pounds. Though this may seem of comparatively little consequence for a few bushels, yet, for the aggregate of the wheat crop of the United States, or for a State, or even a county, it makes a great difference. Thus, were we to estimate the product of one year in the United States at one hundred and ten million bushels, weighing fifty-six pounds to the bushel, and another year at one hundred and eight million bushels, weighing sixty-two pounds, the difference in favor of the latter, though the least in quantity, would amount to five hundred and thirty-six million pounds in weight, or more than one million and a quarter of barrels of flour.*

It may be remarked, however, that it is not after all so easy to determine with accuracy the weight of a bushel of wheat, nor to decide upon the circumstances which have an influence in increasing the density of a grain of wheat. If the microscopical representation given on page 56 is to be relied on, it is probable that the increase in the density of wheat depends upon the increase in the proportion of gluten. I have found in several cases that, the proportion of water being the same, those samples of wheat which contain the largest proportion of gluten exhibit the highest specific gravity, or in other words, will yield the greatest number of pounds to the bushel. But the weight of wheat will be influenced by the proportion of water which it contains; the drier the grain, the greater is its density; a fact which may account for the difference which has been observed in the weight of wheat in different seasons. If this is the cause, the calculation above given in reference to the United States is fallacious—but if the amount of gluten is *actually*, instead of *relatively*, increased by peculiarities in seasons, it is no doubt correct.

I have devised a series of experiments to test the accuracy of the statements made upon this point, but have not yet had leisure to complete them.

General Conclusions from the Analyses of Wheat Flour.

The large number of analyses which I have made, and the uniformity of the processes pursued, enable me to draw some general conclusions which it may be useful to present in a connected form.

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* Report of the Commissioner of Patents for 1847, p. 117.

1. In the samples from the more northern wheat-growing States, there seems to be little difference in the proportion of nutritive matter that can be set down to the influence of climate. Thus, the yield of the wheat from Michigan, Wisconsin and Iowa, is scarcely inferior to that from New York, Indiana, and Illinois, although the two latter are somewhat farther south. Local causes, and more especially the peculiarities of culture and manufacture, have more influence, within these parallels of latitude, than the difference of mean temperature.

2. The samples from New Jersey, lower Pennsylvania, the southern part of Ohio, Maryland (probably Delaware), Virginia, the Carolinas, and Georgia,* contain less water and more nutritive matter than those from the States previously enumerated. That the samples from Missouri, which is included within nearly the same parallels of latitude as Virginia, do not exhibit so high an average of nutritive matter as those from the latter State, must be ascribed principally to a want of care in the management of the crop, and perhaps also in the manufacture of the flour. Virginia flour, for obvious reasons, maintains a high reputation for shipment.

3. The difference in the nutritive value of the various samples of wheat depends greatly upon the variety, and mode of culture, independently of climate. The correctness of the former statement is shown by the much larger proportions of gluten yielded by many of the samples of *hard* wheat from abroad, the Oregon wheat in Virginia, and a variety of Illinois wheat, &c. And in regard to the effect of particular modes of culture, the various analyses of Boussingault may be referred to, and that in my table of a sample from Ulster county, New York.

4. The deterioration of many of the samples of wheat and wheat flour arises in most cases from the presence of a too large per centage of water. This is often the result of a want of proper care in the transport, and is the principal cause of the losses which are sustained by those who are engaged in this branch of business.

5. There seems to be little doubt that a considerable portion of the wheat and wheat flour, as well as of other breadstuffs, shipped from this country to England, is more or less injured before it reaches that market. It is also shown that this is mostly to be ascribed to the want of care above noticed, and to the fraudulent mixture of good and bad kinds. The remedy in the former case is the drying of the grain or flour before shipment, by some of the modes proposed, and the protection of it afterwards as completely as possible from the effect of moisture. The frauds which are occasionally practiced should be promptly exposed, and those who are engaged in them held up to merited reproach.

6. It has been fully shown by the results of many trials that the flour obtained by the second grinding of wheat, or the whole meal, contains more gluten than the fine flour. Hence the general use of the latter, and the entire rejection of the bran, is wasteful, and ought in every way to be discouraged.

7. It cannot but be gratifying to us that the average nutritive value of the wheat and wheat flour of the United States is shown by these analyses to be fully equal to, if not greater than, that afforded by the samples produced in any other part of the world. And it will, in my opinion, be chiefly owing to a want of proper care and of commercial honesty, if the great advantages

* I have had no opportunity of analyzing samples of flour from the South-Western States, and therefore cannot extend this comparison to them.

which should accrue to this country from the export of these articles are either endangered or entirely lost.

Results of the Analyses of Wheat and Wheat Flour, made during the year 1849.

NEW JERSEY.

I. Wheat flour from "Country Mills," New Jersey; not very finely ground nor very white. (From Messrs. Hoagland & Campbell, New Brunswick, N. J.)

Water		12.75
Gluten	12.40	12.55
Albumen	0.15	
Starch (by difference)		65.95
Glucose, dextrine, &c		8.10
Bran		0.65
		100.00

The gluten was very elastic and of excellent quality. One of the best Northern samples.

II. West Jersey wheat flour (1849). (From Mr. John H. Janeway, of Philadelphia.)

Water	12.80
Gluten and albumen	11.32
Starch (by difference)	69.48
Glucose, dextrine, &c	5.90
Bran	0.50
	100.00

The gluten in this sample was of fair quality.

III. Wheat flour from white wheat raised by John S. Voorhees, at three Mile Run, N. J., slightly mixed with red wheat from the same vicinity; ground at Letson's Mill, New Brunswick, N. J.

Water	11.55
Gluten and albumen	12.60
Starch (by difference)	66.85
Glucose, dextrine, &c	8.50
Bran	0.50
	100.00

This flour, though not very white, was of fine quality, and well suited for the manufacture of bread.

PENNSYLVANIA.

IV. Wheat flour from the Canal Mill, New Brunswick, N. J., said to be from Pennsylvania wheat. (From Messrs. Hoagland and Campbell, New Brunswick.)

Water	11.90
Gluten and albumen	13.16
Starch	66.20
Glucose, dextrine, &c	7.25
Bran	0.75
	99.26

This flour was of excellent quality. Indeed, it is one of the richest in gluten of all the Northern samples. The precise place of the growth of the wheat I have been unable to learn.

V. Wheat from ship Arabella, from Philadelphia, 16th November, 1848, arrived in Liverpool, January 3d, 1849. (From the U. S. Consul at Liverpool.) The grain was large and plump, with a thin husk. It was ground in a mill and passed through a fine bolting-cloth sieve. The fine flour gave

Water	13.35
Gluten and albumen	12.73
Starch (by difference)	66.90
Glucose, dextrine, &c.	6.50
Bran	0.52
	100.00

VI. Wheat flour obtained from the above sample by passing the portion which remained on the sieve a second time through the bolting-cloth sieve.

Water	13.35
Gluten and albumen	14.72
Starch, glucose, dextrine, &c. (by diff.)	71.28
Bran	0.65
	100.00

In both the preceding samples, the gluten was of a fair quality. The last analysis was conducted for the purpose of comparing the product of the first and second grinding. This wheat contained an unusually large proportion of water, viz., 13.38 per cent.

NEW YORK.

VII. Wheat flour from wheat grown on the Pelham Farm, Ulster Co., described in the Report of the Commissioner of Patents for 1847, page 117, as being very rich in gluten. (From R. L. Pell, Esq., Ulster Co.)

Water	10.79
Gluten and albumen	13.17
Starch	67.74
Glucose, dextrine, &c	7.60
Bran	0.70
	100.00

This sample is represented as having been obtained from wheat, raised by particular management, which weighed sixty-five pounds per bushel. It is said that Dr. Gardner obtained eighteen per cent. of gluten from this flour; but the proportion above given was the highest of two trials, the other yielding a few hundredths of a grain less. The excess of nearly five per cent. must, I think, be due to imperfect desiccation. In all my analyses, the gluten was subjected to the heat of the salt water oven for from eight to twelve hours.

VIII. Wheat flour, labeled "Pure Genesee," obtained in New York. (From Messrs. James Bishop & Co., N. Y.)

Water	13.20
Gluten and albumen	11.05
Starch, glucose, dextrine, &c. (by diff.)	75.20
Bran	0.55
	100.00

This flour was of a good quality; gluten elastic, flowing by heat. The process was not followed out to the end.

OHIO.

IX. Wheat flour labeled "Ohio Fine," obtained in New York. (From Messrs. James Bishop & Co.)

Water	12.85
Gluten and albumen	12.25
Starch, glucose, dextrine, &c. (by diff.)	73.90
Bran	1.00
	100.00

The gluten of this flour was only of medium quality. As I had previously analyzed several specimens from this State, I did not follow out the process to the end.

X. Wheat flour labeled "Ohio Superfine," obtained in New York. (From Messrs. James Bishop & Co.)

Water	13.00
Gluten	9.10
Starch, glucose, dextrine, &c. (by diff.)	77.80
Bran	0.10
	100.00

This flour had sustained some injury, and was unfit for export, or for home use. The gluten formed shreds on the hand, was wanting in elasticity, and dried away, instead of flowing, upon the application of heat.

XI. Wheat from the schooner Montgomery, from Sandusky, Ohio. "Winter wheat, somewhat below the average crop of 1848." (From the U. S. Collector at Buffalo, N. Y.) The grain of this sample was mostly large and plump, mixed with smaller and shriveled ones. It contained 10.65 per cent. of water. The composition of the fine flour obtained from this wheat was the following:—

Water	13.10
Gluten and albumen	11.56
Starch	66.84
Glucose, dextrine, &c	7.90
Bran	0.60
	100.00

XII. Flour obtained from grinding the residue from the preceding yielded

Water	13.05
Gluten	12.69
Starch, glucose, dextrine, &c. (by diff.)	73.61
Bran	0.65
	100.00

The gluten in both the preceding samples from this wheat was of a good quality—the proportion being larger in the result of the re-grinding.

MICHIGAN.

XIII. Wheat flour labeled "Michigan Superfine," obtained in New York. (From Messrs. James Bishop & Co.)

Water	13.25
Gluten and albumen	11.10
Starch, glucose, dextrine, &c., (by diff.)	74.80
Bran	0.85
	100.00

The gluten of this flour was of good quality; elastic and flowing by heat. I did not follow out the process to the end.

XIV. Fair sample of Michigan wheat of 1848, from cargo shipped on the schooner H. H. Sizer, from St. Josephs, Michigan. (From U. S. Collector at Buffalo, N. Y.) The wheat was ground in a mill, and twice passed through a bolting-cloth sieve. The fine flour was first subjected to analysis, and gave the following, viz:—

Water	12.25
Gluten	10.00
Starch	67.70
Glucose, dextrine, &c.	8.75
Bran	0.75
	99.45

The flour obtained from this wheat was of an inferior quality. It seemed to have lost some of its gluten, and the elasticity of the portion that remained was impaired.

XV. Wheat flour obtained by re-grinding and sifting the residue from the preceding.

Water	12.75
Gluten (similar to the preceding)	11.20
Starch	66.00
Glucose, dextrine, &c.	8.50
Bran	1.05
	99.50

The second grinding, as usual, furnished a larger proportion of gluten, although its quality remained the same as in the preceding.

ILLINOIS.

XVI. Wheat from Littlefort, Illinois; shipped on board the brig Shakspeare, 1848. (From the Collector at Buffalo, N. Y.) This is a spring wheat, containing 11.43 per cent. of water, and yielding a somewhat dark flour, which gave the following results:—

Water	12.73
Gluten and albumen	14.61
Starch	65.20
Glucose, dextrine, &c.	6.45
Bran	0.80
	99.79

This sample was very rich in gluten, which was of a good quality, but became dark-colored by heat.

MISSOURI.

XVII. Superfine flour from Magnolia Mill, St Louis, Missouri. (From Mr. T. Gray, St. Louis.)

Water	13.13
Gluten and albumen	10.27
Starch	69.75
Glucose, dextrine, &c	6.15
Bran	0.35
	99.65

The gluten in this sample was of a medium quality. Its elasticity was somewhat diminished.

XVIII. Superfine flour from Mound Mill, St. Louis, Missouri, Hendrickson. (From Mr. T. Gray, St. Louis.)

Water	13.48
Gluten and albumen	10.53
Starch	67.35
Glucose, dextrine, &c.	8.15
Bran	0.20
	99.71

The gluten was of a good quality. The proportion of water, as in most of the Missouri samples, was rather large.

XIX. Superfine flour from Walsh's Mill, St. Louis, Missouri, Messrs. J. & E. Walsh. (From Mr. T. Gray, St. Louis.)

Water	12.70
Gluten	10.63
Starch	69.40
Glucose, dextrine, &c.	6.65
Bran	0.40
	99.78

XX. Superfine flour from Washington Mill, St. Louis, Missouri. Messrs. Ball and Chapin. (From Mr. T. Gray, St. Louis.)

Water	12.88
Gluten and albumen	11.00
Starch (by diff.)	68.65
Glucose, dextrine, &c	7.27
Bran	0.20
	100.00

Both the preceding samples were of fair quality.

XXI. Extra superfine wheat flour from Missouri Mill. Messrs. Powell, Barlow & Co., St. Louis, Missouri. (From Mr. T. Gray, St. Louis.)

Water	13.00
Gluten	10.46
Starch (by difference)	67.79
Glucose, dextrine, &c	8.35
Bran	0.40
	100.00

Although marked as "extra superfine," this sample was only of medium quality. The gluten had sustained some injury.

XXII. Wheat flour from O'Fallon's Mill, St. Louis, Missouri (Sept. 25th, 1848). Messrs. J. G. Shands & Co. (From Mr. T. Gray, St. Louis.)

Water	12.85
Gluten	11.25
Starch	68.24
Glucose, dextrine, &c	7.00
Bran	0.66
	100.00

XXIII. Superfine wheat flour, from Phœnix Mill, St. Louis, Missouri. (From Mr. T. Gray, St Louis.)

Water	13.22
Gluten	10.10
Starch	68.70
Glucose, dextrine, &c.	7.30
Bran	0.15
	99.47

In this and the preceding samples, the gluten was of good quality.

XXIV. Superfine wheat flour, Nonantum Mill, St. Louis, Missouri. (From Mr. T. Gray, St. Louis.)

Water	12.10
Gluten	11.02
Starch	68.60
Glucose, dextrine, &c.	7.93
Bran	0.35
	100.00

This flour was of an excellent quality and in good condition.

XXV. Superfine wheat flour from Franklin Mill, St. Louis, Missouri. (From Mr. T. Gray, St. Louis.)

Water	12.25
Gluten and albumen	10.29
Starch	69.85
Glucose, dextrine, &c.	7.26
Bran	0.35
	100.00

XXVI. Superfine flour, Eagle Mill, St. Louis, Missouri. (From Mr. T. Gray, St. Louis.)

Water	11.00
Gluten and albumen	10.15
Starch	69.50
Glucose, dextrine, &c.	8.65
Bran	0.20
	99.50

Although the proportion of gluten was small, this flour was of good quality.

XXVII. Winter wheat from Missouri (1848). (From Mr. T. Gray, St. Louis.) The grain was plump, husk thin; it yielded 12.95 per cent. of water. The flour obtained by grinding in a mill and twice sifting through fine bolting-cloth, gave the following:—

Water	14.00
Gluten and albumen	9.30
Starch (by diff.)	70.05
Glucose, dextrine, &c.	6.30
Bran	0.35
	100.00

This flour is of a medium quality, although the proportion of gluten is small. It could not bear the test of shipment, as is sufficiently shown by the considerable proportion of water which it contains.

WISCONSIN.

XXVIII. Wheat from cargo shipped on the schooner Cleopatra, from Milwaukie, spring and winter wheat mixed, the growth of 1848. (From the U. S. Collector at Buffalo, N. Y.)

The fine flour obtained from this wheat gave the following results:—

Water	12.80
Gluten and albumen	11.30
Starch	68.90
Glucose, dextrine, &c.	6.50
Bran	0.70
	100.20

XXIX. Wheat flour obtained by passing the residue from the preceding a second time through the mill and sieve.

Water	12.80
Gluten	13.46
Starch, glucose, dextrine, &c. (by diff.)	72.54
Bran	1.20
	100.00

In this and the preceding, the gluten was of good quality. The flour obtained from the second grinding, &c., yielded, as will be perceived, a larger proportion of gluten, while the bran was also in larger quantity.

MARYLAND.

XXX. Wheat flour exported from Baltimore to Montevideo, in Uruguay, in 1848. (Sample received from the U. S. Consul, at Montevideo.)

Water	13.00
Gluten and albumen	12.30
Starch	66.65
Glucose, dextrine, &c.	7.10
Bran	0.65
	99.70

The gluten of this sample was only of medium quality. The flour must have been of a superior kind to have passed through so severe a trial with so little injury.

VIRGINIA.

XXXI. Wheat flour from the Richmond city mill: obtained in New York. (From Messrs. James Bishop and Co., crop of 1848.)

Water	11.70
Gluten and albumen	13.00
Starch	67.50
Glucose, dextrine, &c.	6.90
Bran	0.50
	99.60

This flour, though not remarkably white, was of an excellent quality. The gluten was very elastic, flowed by heat, and was of a light color when dry. The reputation of this flour in market, especially for Southern export, seems to be well deserved. It is sometimes, however, objectionable, as are also many of the New Jersey samples, on account of the garlic odor which it gives out.

XXXII. Wheat flour manufactured by Haxall, Bros. and Co., Richmond, Va., obtained in New York. (From Messrs. James Bishop and Co., crop of 1848.)

Water	11.40
Gluten and albumen	12.80
Starch	68.50
Glucose, dextrine, &c.	6.60
Bran	0.35
	99.65

This flour was similar to the preceding. It yielded a fine elastic gluten, which assumed a light color when heated.

XXXIII. Richmond superfine flour of 1848, name of the manufacturer unknown. (From Mr. James A. Scott, Richmond, Va.)

Water	12.05
Gluten and albumen	12.95
Starch, glucose, dextrine, &c. (by diff.)	74.50
Bran	0.50
	100.00

This flour was of an excellent quality. Gluten elastic, and light-colored.

XXXIV. Richmond wheat flour, Haxall's best brand, from the crop of 1849. Manufactured by Messrs. Haxall, Bros. and Co. (From Mr. James A. Scott, Richmond, Va.)

Water	11.40
Gluten and albumen	13.25
Starch	68.20
Glucose, dextrine, &c	6.25
Bran	0.60
	99.70

This was one of the very best samples of wheat flour that I have as yet analyzed.

XXXV. Richmond flour, second brand: crop of 1849. Columbia wheat

flour, manufactured by Messrs. Haxall, Bros. & Co. (From Mr. James A. Scott, Richmond, Va.)

Water	11.00
Gluten	13.20
Starch, glucose, &c. (by diff.)	75.60
Bran	0.20
	100.00

This flour was excellent so far as the amount and quality of the gluten are concerned. It had a slight garlic odor, which must impair its value.

XXXVI. Family flour, manufactured in 1849, at the Richmond city mill. (From Mr. James A. Scott, Richmond, Va.)

Water	11.90
Gluten	10.50
Starch	70.00
Glucose, dextrine, &c.	7.10
Bran	.50
	100.00

This sample contained less gluten than either of the preceding ones from Virginia, but the quality was good.

XXXVII. "Oregon white wheat," grown by Bernard Peyton, Esq., of Richmond, Va., at Westham Cottage, on James River, 1849. (From Mr. James A. Scott, Richmond, Va.) This sample had the grain hard and plump; it contained 11.95 per cent. of water. A portion of this wheat ground and twice sifted through bolting-cloth yielded the following:—

Water	12.80
Gluten	14.80
Starch, glucose, dextrine, &c. (by diff.)	71.30
Bran	1.10
	100.00

The gluten in this sample was in large proportion and of an excellent quality. One of the finest samples of wheat, and worthy of trial in more northern localities.

XXXVIII. The residue left from the preceding ground and sifted a second time, gave the following results:—

Water	13.85
Gluten	14.50
Starch (by diff.)	65.15
Glucose, dextrine, &c.	5.90
Bran	0.60
	100.00

This sample was accidentally exposed to the air for forty-eight hours, which will account for the larger proportion of water. Reducing the amount of water in it to that in the preceding, the gluten will be nearly the same.

XXXIX. Gallego wheat flour, manufactured by Messrs. Warwick &

Barksdale, Gallego Mills, Richmond, Va., ground in August 1849. (From Mr. James A. Scott, Richmond, Va.)

Water	11.50
Gluten	13.50
Starch (by diff.)	68.35
Glucose, dextrine, &c	6.00
Bran	0.65
	100.00

The results of the above analysis fully account for the high reputation which this flour bears in market.

Results of the Analysis of Various Samples of Wheat and Wheat Flour Shipped from Ports in the United States to Liverpool.

(From Mr. Armstrong, late Consul at Liverpool.)

XL. Wheat flour from ship Brandywine, from New Orleans, 22d November 1848; arrived in Liverpool 30th December, 1848.

Water	13.38
Gluten and albumen	10.62
Starch	67.60
Glucose, dextrine, &c	7.75
Bran	0.65
	100.00

The gluten was wanting in elasticity, although not seriously injured.

XLI. Wheat flour from ship Fanchon, New York, November 7th, 1848; arrived at Liverpool November 28th, warehoused December 8th, 1848.

Water	13.83
Gluten and albumen	11.38
Starch	67.45
Glucose, dextrine,	6.34
Bran	1.00
	100.00

This flour was rather coarsely ground. The gluten was of a fair quality.

XLII. Wheat flour from ship New World, New York, November 8th, 1848; arrrived at Liverpool November 26th, warehoused December 4th, 1848.

Water	13.65
Gluten and albumen	11.60
Starch	65.80
Glucose, dextrine, &c	7.70
Bran	0.65
	99.40

This flour had evidently undergone some change. The gluten, although of the medium proportion, wanted the elasticity and other properties which characterize good samples.

XLIII. Wheat flour from ship Juniata, from Baltimore, October 1848; arrived at Liverpool November 9th, warehoused November 14th, 1848.

Water	12.50
Gluten and albumen	14.14
Starch	64.20
Glucose, dextrine, &c	8.36
Bran	0.80
	100.00

This sample was in a good state of preservation and rich in gluten. Rather coarsely ground.

XLIV. Wheat flour from ship Stephen Lurman, from Baltimore, Nov. 5th, 1848; arrived at Liverpool Dec. 1st, warehoused Dec. 6th, 1848.

Water	11.65
Gluten and albumen	13.18
Starch	64.50
Glucose, dextrine, &c	9.55
Bran	0.68
	99.56

This sample, like the preceding, was rather coarsely ground. The proportion of gluten was above the ordinary standard.

XLV. Wheat flour from ship Leila, from Baltimore, November 29th, 1848; arrived at Liverpool January 1849.

Water	13.22
Gluten and albumen	13.18
Starch	64.65
Glucose, dextrine, &c	8.00
Bran	0.95
	100.00

This flour was of good quality, coarsely ground, and not very white.

XLVI. Wheat flour from ship Oxenbridge, from New Orleans, November 13th, 1848; arrived at Liverpool December 31st, 1848.

Water	13.90
Gluten and albumen	10.13
Starch	68.42
Glucose, dextrine, &c	7.30
Bran	0.25
	100.00

The proportion of water in this sample was somewhat larger than usual, and the gluten had partly lost its elasticity. I did not detect any acidity.

XLVII. Wheat flour from ship Italy, from New York, December 1st, 1848; arrived at Liverpool December 31st, 1848.

Water	12.94
Gluten and bran	10.60
Starch (by difference)	68.56
Glucose, dextrine, &c	7.90
	100.00

This sample was sour. The gluten was inelastic, breaking into shreds by washing, and with difficulty forming a dough in the hand. By heat, the

mass thus obtained assumed a powdery form, without the horny appearance of good gluten. A second analysis gave me about 9.75 per cent. of gluten, exhibiting the same characters. In samples thus damaged, however, little reliance can be placed upon the accuracy of the separation of the gluten; but this is after all of no great importance.

As it is hardly probable that this flour was shipped from New York in the condition in which it was shown to be by the above analysis, it must have been damaged during its passage.

XLVIII. Wheat flour from ship West Point, from New York, December 13th, 1848; arrived at Liverpool January 1st, 1849.

Water	14.30
Gluten and albumen	12.30
Starch	63.00
Glucose, dextrine, &c	9.45
Bran	0.95
	100.00

The gluten in this flour was somewhat deficient in elasticity, and did not exhibit the peculiar flowing appearance under the influence of heat, which characterizes good samples. The proportion of glucose, &c., was larger, while that of starch was smaller than usual.

XLIX. Wheat flour from ship Wm. H. Harbeck, from New York, October 19th, 1848; arrived at Liverpool November 21st; warehoused November 29th, 1848.

Water	13.53
Gluten and albumen	10.18
Starch	66.95
Glucose, dextrine, &c.	8.80
Bran	0.30
	99.76

The gluten in this sample was deficient in elasticity.

L. Wheat flour from ship Princeton, from New York, October 27th, 1848; arrived at Liverpool November 23d; warehoused November 25th, 1848.

Water	13.40
Gluten and albumen	11.52
Starch	65.60
Glucose, dextrine, &c	7.90
Bran	0.85
	99.27

This flour was of fair quality.

LI. Wheat flour from ship Columbus, from New York, December 1st, 1848; arrived at Liverpool December 31st, 1848.

Water	13.50
Gluten and albumen	10.45
Starch	66.45
Glucose, dextrine, &c.	8.50
Bran	1.03
	99.93

This flour was not of very good quality. The gluten was deficient in elasticity, although not spoiled.

LII. Wheat flour from ship Russell Glover, from New Orleans, November 1st, 1848; arrived at Liverpool January 6th, 1849.

Water	13.45
Gluten and albumen	10.47
Starch	66.20
Glucose, dextrine, &c	8.83
Bran	1.05
	100.00

The gluten of this flour was somewhat inelastic and dark-colored. It seemed to have suffered by shipment.

LIII. Wheat from ship South Carolina, from New Orleans, October 24th, 1848; arrived at Liverpool December 19th, 1848. The grain of this sample was small and rather thin-skinned. It contained 12.75 per cent. of water. The fine flour gave the following results:—

Water	13.80
Gluten and albumen	9.00
Starch	70.80
Glucose, dextrine, &c	5.95
Bran	0.38
	99.93

The gluten was in small proportion, but appeared to be of good quality.

LIV. The product of the second grinding of the residue from the above, gave,

Water	13.30
Gluten	9.45
Starch, glucose, dextrine, &c. (by diff.)	76.90
Bran	0.35
	100.00

LV. Wheat from ship Cambridge, from New York, October 18th, 1848; arrived at Liverpool November 22d, 1848. This wheat had a large plump grain, with a few smaller and shriveled ones intermixed. It contained 13.80 per cent. of water.

The fine flour obtained from this sample by grinding and twice sifting through fine bolting-cloth, gave the following results:—

Water	14.50
Gluten and albumen	8.52
Starch	70.60
Glucose, dextrine, &c	5.40
Bran	0.40
	99.42

LVI. The residuum from the above, ground and sifted a second time, gave,

Water	14.10
Gluten and albumen	9.10
Starch	70.55
Glucose, dextrine, &c	5.45
Bran	0.20
	99.40

Both this and the preceding sample from the same wheat were of a good quality, although the proportion of gluten was below the ordinary standard. The amount of water was large.

LVII. Wheat from ship Columbus from New York, December 1st, 1848; arrived at Liverpool December 31st, 1848. This wheat was much shrunk. It was soft and easily ground. It contained 13.05 per cent. of water.

The fine flour from this contained,

Water	14.85
Gluten	8.47
Starch, glucose, dextrine, &c. (by diff.)	76.48
Bran	0.20
	100.00

LVIII. The residuum from the above, ground and twice sifted, gave,

Water	14.15
Gluten	9.00
Starch, glucose, dextrine, &c. (by diff.)	76.60
Bran	0.25
	100.00

This wheat yielded a gluten which was of a good quality, though small in amount.

LIX. Wheat from ship Ashburton, from New York, December 7th, 1848; arrived at Liverpool January 3d, 1849. The grain of this wheat was soft and rather small. It yielded a white flour, and contained fourteen per cent. of water. The fine flour obtained from this wheat, by grinding and passing it twice through a fine bolting-cloth sieve, gave the following results:—

Water	13.55
Gluten	11.68
Starch (by diff.)	69.22
Glucose, dextrine, &c	5.30
Bran	0.25
	100.00

This flour was of an excellent quality. It is somewhat remarkable that the wheat contained more water than the flour; the latter of which from its nature absorbs a larger quantity of moisture than the former. As the heatings and weighings were carefully performed, the difference may have been caused by the rapid grinding and bolting.

Results of the Analyses of Samples of Wheat and Wheat Flour, the Growth and Manufacture of Foreign Countries.

CANADA WEST.

LX. "Good sample of white wheat," from cargo shipped on steamer London, from Port Stanley, Canada West. (From the U. S. Collector at Buffalo, N. Y.) This wheat had a plump grain, and contained 11.45 per cent. of water. The fine flour, obtained by grinding and twice passing through the sieve, yielded the following results:—

Water	12.80
Gluten	7.23
Starch (by difference)	74.12
Glucose, dextrine, &c	5.10
Bran	0.75
	100.00

LXI. Flour obtained by subjecting the residue from the preceding to grinding and sifting a second time.

Water	12.60
Gluten	8.45
Starch, glucose, dextrine, &c. (by diff.)	78.55
Bran	0.40
	100.00

The gluten of this wheat was not only diminished in quantity, but had lost its elasticity, so as to render the flour unfit for use. The starch was of an excellent quality; its large amount was probably owing to the change of the gluten. I regret that I had no other samples of wheat from Canada to compare with those which are grown in the northern and western parts of the United States. The preceding, being injured during shipment, did not of course afford a fair test. It was interesting, however, as showing the extent to which breadstuffs are in this way deteriorated.

CHILI.

LXII. Chilian wheat flour, from Montevideo, in Uruguay, 1848. (From the U. S. Consul at Montevideo.)

Water	12.44
Gluten and albumen	9.45
Starch	67.80
Glucose, dextrine, &c	8.37
Bran	1.30
	99.36

This flour was of a fair quality, but as the wheat from that country has been highly praised, I was disappointed to find the proportion of gluten so much below the standard in the samples from the United States.

LXIII. Chilian wheat; Montevideo, in Uruguay, 1848. (From the U. S. Consul at Montevideo.) The grain of this wheat was large and plump, and had a thin husk. The fine flour, obtained by grinding and sifting through fine bolting-cloth, gave the following results:—

Water	12.85
Gluten and albumen	8.65
Starch	71.60
Glucose, dextrine, &c.	6.10
Bran	0.60
	99.80

LXIV. Wheat from Valparaiso. (Received through Mr. David Bishop, of New Brunswick, N. J.) This was a hard-grained and horny wheat, entirely different from the preceding. It yielded a yellowish flour, like that of maize, and also resembling in appearance the flour from the Kubanka wheat. It contained 9.40 per cent. of water. The wheat was twice ground and passed through the sieve. The flour was still gritty, and, on attempting to wash the dough, it separated into strings and fibres. It must have undergone some change, but I was unable to determine the precise nature of it. The flour, as above, was found to contain

Water	12.50
Gluten, with some bran, having no elasticity and becoming pulverulent by heat	14.55

FRANCE.

LXV. French wheat flour imported into England in November, 1848. (From Mr. Armstrong, late U. S. Consul at Liverpool.)

Water	13.20
Gluten and albumen	9.85
Starch	69.00
Glucose, dextrine, &c. (by diff.)	7.65
Bran	0.30
	100.00

This flour was of a fair quality, but it was less rich in gluten than the average of our U. S. samples.

For the sake of comparison, I here introduce the analyses of various samples of French wheat and wheat flour by Vauquelin and Peligot.

Kind of flour or wheat.	Water.	Gluten and Albumen.	Starch.	Other. ingredients.	Total.
Common wheat flour	10.00	10.96	71.49	8.04	100.49 V.
Wheat flour from the bakers of Paris	10.00	10.20	72.80	7.00	100.00 V.
Flour, second quality	8.00	10.30	71.20	8.40	97.90 V.
Wheat grown near Paris	15.20	10.70	63.60	10.50	100.00 P.
Wheat from the Lower Loire	13.90	10.60	66.70	8.80	100.00 P.
Soft wheat of Provence	14.60	9.90	66.10	9.40	100.00 P.

SPAIN.

LXVI. Wheat flour from Santander, made from Spanish wheat. "The sample taken from the original package, as it arrived in May, 1848." (From George Read, Esq., U. S. Consul at Malaga.)

Water	13.50
Gluten and albumen	10.30
Starch	68.90
Glucose, dextrine, &c.	7.00
Bran	0.30
	100.00

This flour was of a good quality.

LXVII. Wheat flour from *Cañivano*, or *soft wheat*, grown five or six leagues N. W. of Malaga. (From George Read, Esq., U. S. Consul at Malaga.) This flour has a yellowish color, like maize meal; it contains,

Water	11.33
Gluten	16.35
Starch	63.10
Glucose, dextrine, &c.	6.50
Bran	2.30
	99.58

This sample was remarkable for the large proportion of gluten (analysis twice repeated) which it contains. The gluten was excellent, and in amount only equaled by the flour from the Kubanka wheat.

LXVIII. Soft or *Cañivano* wheat, grown five or six leagues N. W. of Malaga. (From George Read, Esq., U. S. Consul at Malaga.)

This wheat was ground in a mill and passed through fine bolting-cloth. The fine flour gave the following:—

Water	11.15
Gluten	15.40
Starch	67.25
Glucose, dextrine, &c.	5.70
Bran	0.60
	100.10

LXIX. A coarser sample of flour, obtained by grinding the residue from the preceding, gave,

Water	12.60
Gluten	18.70
Starch, glucose, dextrine, &c. (by diff.)	67.00
Bran	1.70
	100.00

The gluten from this sample was in large proportion and of a good quality. The whole meal as usual gave better results than the fine flour.

LXX. Wheat flour from the grain called *Trigo Recio*, hard wheat grown on the grounds about thirty miles north of Malaga. (From George Read, Esq., U. S. Consul at Malaga.)

Water	10.87
Gluten, &c.	12.15
Starch	64.38
Glucose, &c. (lactic acid?)	12.60
	100.00

This sample it is to be regretted was musty and otherwise injured. It was of a yellowish color and coarsely ground. The gluten had entirely lost its elasticity. This flour is represented as being of a fine quality, when uninjured.

LXXI. Wheat grown on the high grounds about thirty miles north of Malaga, of the kind called *Trigo Recio, hard* wheat, or *Trigo Claro.* (From George Read, Esq., U. S. Consul at Malaga.) This wheat has a large hard grain, and gives a flour like that above described. This sample like the preceding, was damaged. It contained 7.45 per cent. of water. I could only succeed in making an imperfect analysis, as the gluten had entirely lost its elasticity. The results are as follows:—

Water	10.00
Gluten, &c	14.50
Starch	60.20
Glucose, dextrine, &c. (lactic acid ?)	15.30
	100.00

Table Exhibiting the Composition of Various Samples of American and Foreign Wheat Flour, by Lewis C. Beck, M.D. (1849).

Kind of Wheat Flour.	Water.	Gluten and albumen.	Starch.	Glucose, dextrine, &c.	Bran.	Total.
I. From Country Mills, New Jersey	12.75	12.55	65.95	8.10	0.65	100.00
II. From West Jersey Wheat	12.80	11.32	69.48	5.90	0.50	100.00
III. From White Wheat, New Jersey	11.55	12.60	66.85	8.50	0.50	100.00
IV. From Pennsylvania Wheat	11.90	13.16	66.20	7.25	0.75	99.26
V. From do do	13.35	12.73	66.90	6.50	0.52	100.00
VI. From do do (2d grinding)	13.35	14.72	71.28		0.65	100.00
VII. From Pelham Wheat, Ulster Co., N. Y.	10.79	13.17	67.74	7.60	0.70	100.00
VIII. From "Pure Genesee" Wheat	13.20	11.05	75.20		0.55	100.00
IX. From Ohio Wheat, "fine"	12.85	12.25	73.90		1.00	100.00
X. From Ohio Wheat, "Superfine"	13.00	9.10	77.80		0.10	100.00
XI. From Winter Wheat, Ohio	13.10	11.56	66.84	7.90	0.60	100.00
XII. From do do (2d grinding)	13.05	12.69	73.61		0.65	100.00
XIII. From Michigan Wheat, "Superfine"	13.25	11.10	74.80		0.85	100.00
XIV. From Michigan Wheat	12.25	10.00	67.70	8.75	0.75	99.45
XV. From do do (2d grinding)	12.75	11.20	66.00	8.50	1.05	99.50
XVI. From Illinois Wheat	12.73	14.61	65.20	6.45	0 80	99.79
XVII. From Magnolia Mill, St. Louis, Mo.	13.13	10.37	69.75	6.15	0.35	99.65
XVIII. From Mound Mill, St. Louis	13.48	10.53	67 35	8.15	0.20	99.71
XIX. From Walsh's Mill, St. Louis	12.70	10.63	69.40	6.65	0.40	99.78
XX. From Washington Mill, St. Louis	12.88	11.00	68.65	7.27	0.20	100.00
XXI. From Missouri Mill, St. Louis	13.00	10.46	67.79	8.35	0.40	100.00
XXII. From O'Fallon's Mill, St. Louis	12.85	11.25	68.24	7.00	0.66	100.00
XXIII. From Phœnix Mill, St. Louis	13.22	10.10	68.70	7.30	0.15	99.47
XXIV. From Nonantum Mill, St. Louis	12.10	11.02	68.60	7.93	0 35	100.00
XXV. From Franklin Mill, St. Louis	12.25	10.29	69.85	7.26	0.35	100.00
XXVI. From Eagle Mill, St. Louis	11.00	10.15	69.50	8.65	0 20	99.50
XXVII. From Winter Wheat, Missouri	14.00	9.30	70.05	6.30	0.35	100.00
XXVIII. From Wisconsin Wheat	12.80	13.20	68.90	6.50	0.70	100.00
XXIX. From do do (2d grinding)	12.80	13.46	72.54		1.20	100.00
XXX. From Maryland Wheat	13.00	12.30	66.65	7.10	0.65	99.70
XXXI. From Richmond City Mill	11.70	13.00	67.50	6.90	0.50	99.60
XXXII. From Haxall & Co., Richmond, Va.	11.40	12.80	68.50	6.60	0.35	99.65

Kind of Wheat.	Water.	Gluten and albumen.	Starch.	Glucose, dextrine, &c.	Bran.	Total.
XXXIII. From Virginia Wheat, "Superfine"	12.05	12.95	74.50		0.50	100.00
XXXIV. From Haxall & Co. "Best brand '49"	11.40	13.25	68.20	6.25	0.60	99.70
XXXV. From Haxall & Co. "2d brand '49"	11.00	13.20	75.60		0.20	100.00
XXXVI. From Richmond City Mill, '49	11.90	10.50	70.00	7.10	0.50	100.00
XXXVII. From Oregon White Wheat, Va.	12.80	14.80	71.30		1.10	100.00
XXXVIII. From do do (2d grinding)	13.85	14.50	65.15	5.90	0.60	100.00
XXXIX. From Gallego Mill, Richmond, Va	11.50	13.50	68.35	6.00	0.65	100.00
XL. From Ship Brandywine, Liverpool	13.38	10.62	67.60	7.75	0.65	100.00
XLI. From Ship Fanchon, Liverpool	13.83	11.38	67.45	6.34	1.00	100.00
XLII. From Ship New World, Liverpool	13.65	11.60	65.80	7.70	0.65	99.40
XLIII. From Ship Juniata, Liverpool	12.50	14.14	64.20	8.36	0.80	100.00
XLIV. From Ship Stephen Lurman, Liverpool	11.65	13.18	64.50	9.55	0.68	99.56
XLV. From Ship Leila, Liverpool	13.22	13.18	64.65	8.00	0.95	100.00
XLVI. From Ship Oxenbridge, Liverpool	13.90	10.13	68.42	7.30	0.25	100.00
XLVII. From Ship Italy, Liverpool	12.94	& bran 10.60	68.56	7.90		100.00
XLVIII. From Ship West Point, Liverpool	14.30	12.30	63.00	9.45	0.95	100.00
XLIX. From Ship W. H. Harbeck, Liverpool	13.53	10.18	66.95	8.80	0.30	99.76
L. From Ship Princeton, Liverpool	13.40	11.52	65.60	7.90	0.85	99.27
LI. From Ship Columbus, Liverpool	13.50	10.45	66.45	8.50	1.03	99.93
LII. From Ship Russell Glover, Liverpool	13.45	10.47	66.20	8.83	1.05	100.00
LIII. From Wheat, Ship South Carolina, Liverpool	13.80	9.00	70.80	5.95	.38	99.93
LIV. From do do do (2d grinding)	13.30	9.45	76.90		.35	100.00
LV. From Wheat, Ship Cambridge, Liverpool	14.50	8.52	70.60	5.40	.40	99.42
LVI. From do do do (2d grinding)	14.10	9.10	70.55	5.45	.20	99.40
LVII. From Wheat, Ship Columbus, Liverpool	14.85	8.47	76.48		.20	100.00
LVIII. From do do do (2d grinding)	14.15	9.00	76.60		.25	100.00
LIX. From Wheat, Ship Ashburton, Liverpool	13.55	11.68	69.22	5.30	.25	100.00
LX. From Wheat grown in Canada West	12.80	7.23	74.12	5.10	.75	100.00
LXI. From do do do (2d grinding)	12.60	8.45	78.55		.40	100.00
LXII. From Chilian Wheat	12.44	9.45	67.80	8.37	1.30	99.36
LXIII. From Chilian Wheat	12.85	8.65	71.60	6.10	.60	99.80
LXIV. From Valparaiso Wheat	12.50	& bran 14.55				
LXV. From French Wheat	13.20	9.85	69.00	7.65	.30	100.00
LXVI. From Spanish Wheat	13.50	10.30	68.90	7.00	.30	100.00
LXVII. From *Cañivano* Wheat	11.33	16.35	63.10	6.50	2.30	99.58
LXVIII. From *Cañivano* Wheat	11.15	15.40	67.25	5.70	.60	100.10
LXIX. From do do (2d grinding)	12.60	18.70	67.00		1.70	100.00
LXX. From *hard* wheat grown near Malaga	10.87	12.15	64.38	12.60		100.00
LXXI. From do do (2d grinding)	10.00	14.50	60.20	& lactic acid. 15.30		100.00

V.

REPORTS AND LETTERS RELATING TO CROPS, &c.

CIRCULAR.

United States Patent Office, Washington, *July*, 1849.

Sir:—A desire faithfully to discharge the duties devolved on this office in relation to Agriculture, prompts me to seek impartially from persons of known experience and research the best information on the several topics embraced in this circular, and upon such others as may, in the judgment of practical men, contribute to the benefit of that vitally important branch of our national industry.

Comprehending, as this circular necessarily does, a variety of subjects, with all of which no one person can be supposed to be practically familiar, it is presumed that each one to whom it may be addressed will confine his observations to such matters as have come under his own experience. Such information, it is the purpose of Congress in this mode to collect and distribute for the common benefit of the agricultural community, and it cannot but be, in the aggregate, of enduring value.

Excluding mere estimates and local details of weather and crops, which may be found in the able agricultural journals of the country, the design of the annual report, to which you are invited to contribute, is to bring to light and register in a permanent form important facts and discoveries, the results of actual experiment, which might not otherwise become so soon nor so widely known.

It is likewise intended to constitute a repository of agricultural statistics, founded upon official and other reliable data, which may serve as authentic bases for the use of the politico-economical inquirer and legislator.

Whatever may have been tested and found new and useful in practice, together with important agricultural statistics, will be acceptable; especially suggestions as to the introduction of such new objects in the way of machinery, animals, processes, or plants, as may tend to the profitable diversifying of the application of labor and capital to the all-important science of cultivation.

With this brief explanation of the objects contemplated by Congress, and leaving to your discrimination to judge how you may best and most conve-

niently assist in their accomplishment, I beg leave to tender in advance, for any contributions you may be pleased to make, my respectful acknowledgments

I remain, yours, respectfully, &c.,

THOMAS EWBANK, *Commissioner.*

The Commissioner of Patents, in execution of acts of Congress, desires to procure information from Planters, Farmers, and others, on the following and any other points that may occur to you connected with Agriculture.

Wheat.—Your experience as to varieties—difference in weight, and of time in ripening—their enemies and diseases—soil and manures best adapted to.

Oats.—What varieties have you tried, and with what results, particularly as to time of ripening—what their estimated value as compared with corn as food—is the cultivation of the oat becoming more or less popular, and for what reason?

Rye.—Have you knowledge of any new and valuable variety—to what uses is it applied—have crops diminished of late years, without any apparently corresponding diminution in the fertility of the soil, and to what influence is it supposed to be attributable?

Barley.—Have any new varieties been tried, and with what results—to what uses is this grain applied in your State—if not cultivated, is it forbidden by your soil and climate?

Maize (Indian Corn).—What varieties most esteemed, and for what reasons—what the difference in time of ripening—is it liable to change of character and qualities according to soil and climate, and other influences, and your observations on that point—give the estimated value of the shuck as compared with the blade, and of both as compared with good hay, weight for weight—what is the value of green corn for soiling cattle, and especially for producing milk—your experience as to feeding grain, whole or ground, cooked or raw.

Rice.—Variety cultivated—describe any new and valuable process for its cultivation or preparation for market.

(*Note.*)—As to all these grains, please state the cost of production and usual weight, and the probable *average* per *acre*, and actual *aggregate product*, if known, of each in your State—whether the average product per acre has increased or diminished—whether the weight per bushel of the various grains is fixed by law in your State, and what weight is prescribed for each.

Hay.—State the comparative value as food for stock, of clover, timothy, and mixed hay—the grass seeds preferred in laying down meadows—the

average yield per acre: describe any new process in curing—have meadows been irrigated in your State, and with what effect?

Peas.—For what purposes cultivated in your State—for food, or for improving the soil—estimated value as food for stock compared with Indian corn—the most esteemed variety for field culture—average product per acre—value of haulm or vines compared with other fodder—average price per bushel in the last year.

Root Crops.—Irish and sweet potato, turnips, carrots, beets, mangold wurtzel, artichoke, and other varieties—comparative value—cost of production—weight per bushel—and the average per acre, and aggregate product for your State.

Cotton.—Average yield per acre and per hand in your State—aggregate yield of the whole State for 1849—describe new varieties and processes of cultivation—manures best adapted to—cost, per pound or bale, of production—freight charges, commissions, &c., paid by the planter.

Sugar.—Whether of cane or maple—the product per acre—describe any new process of cultivation or manufacture—variety of cane cultivated—its enemies and diseases—cost of making sugar—freight, charges, commissions, &c., paid by the planter.

Hemp.—On this head give any information that you may deem valuable and new, as to varieties, processes of cultivation, and preparation for market—soil and manures best adapted to—cost of production.

Dairy Husbandry.

Butter.—Quantity made in your State—average annual produce per cow—are cellars or spring-houses preferred?

Cheese.—Same questions.

Cattle.

Horses and Mules.—Number raised in your State—average value of each—comparative value for farming purposes—where is your market for them?

Number of *Horned Cattle* in your State—average value of, at three years old—where driven to market—cost of keep per head per year—which of the improved races is preferred?

Sheep Husbandry.—What the prevailing races—what the condition of this branch of industry—amount of wool clipped in the year, and average weight of fleece of different races—cost of keeping sheep through the year per head—where your markets—what your system of selling—have you wool depots, and are they found advantageous for wool-grower and manufacturer—what number killed by dogs in your State?

Hogs.—Average weight at a given age—average weight consumed per head—proportion of live to net weight, and cost of production per pound.

Rain.—Time and degree of highest and lowest range of thermometer, and the mean temperature of the year; also inches of rain water in each month, and aggregate for the year.

Labor.—Cost of, with and without boarding, and cost of boarding.

Tar and Turpentine.—Quantity and value of, produced per hand.

Plaster and other Fertilizers.

Lime.—If used as an improver in your State, how much is thought to be best per acre, and how often applied?

Orchards, fruits, transplanting of trees, &c. Information on these and kindred matters, will be of universal interest.

On the cultivation of the Vine—on Grapes, and American Wines, communications are particularly solicited.

P. S.—Please answer as soon as convenient after you procure the information, and, in the mean time, please name any one to whom this circular may be sent in the hope of fuller information. If not room on the circular, please reply on a separate paper, referring distinctly to the queries.

SPRINGFIELD, VT., *Jan'y* 23d, 1850.

SIR:—Having recently received from the P. M. at Rochester in this State, C. Morgan, Esq., your circular of July, 1849, with a request to reply to those inquiries with which I may be conversant by experience and observation, I take pleasure in complying, and will briefly state a few facts, and give my views upon the various topics, so far as they embrace the industrial pursuits of this section of our vast country.

The culture of *wheat* in this part of the State (Windsor county) is but limited, and I think rather diminishing throughout the State, as facilities increase for the transportation of western flour to our borders, though on newly cleared, and on elevated lands of a deep strong soil, fifteen to twenty-five bushels per acre are frequently obtained; but it is by no means a certain crop.

Rye has considerably diminished within the last twenty years, as it is not now considered so important an article for family consumption since western flour has become cheaper and a common article of consumption and necessity in most families; and the praiseworthy and philanthropic spirit of the age having banished the *spirits* formerly extracted from this grain, it is no longer cultivated as a source of profit, and the pernicious and destroying worm of the distillery has ceased to fold its coils among us.

Barley has never become of much note in this section. I am of the opinion that neither our soil nor climate is well adapted to its culture. Oats are a hardy and sure crop, unless affected by a severe and long-continued drouth, as in the early part of the last season, which diminished the production full one-fourth on an average. They are much used, and considered the best grain for horses, find a ready sale, and are profitable, though quite an exhauster to the soil—averaging about forty-five bushels per acre.

Maize or Indian Corn is a great crop with us here in the Connecticut River valley, and the same I believe is true of western Vermont, the valley of the Otter Creek, and along the Lake shore; but on the high dividing ridge, and in the northern counties bordering upon Canada, the climate is too severe for its profitable cultivation. The kind mostly cultivated is the yellow eight-rowed, though some prefer the twelve and sixteen-rowed, known

here by the name of the *Dutton* corn; but my experience in cultivating the different kinds for the last twenty-four years has forced me to the conclusion that the common eight-rowed, mixed with a kind called the *Brown* corn, does the best; the kernel of the latter bearing upon a chocolate hue, and the mixture of these two kinds of seed imparting a deep rich color to the whole, when they become blended, and enhancing the yield whenever the soil is in high tilth. Of this kind, the writer has raised the past season upon eleven acres on the Connecticut River alluvion, over eight hundred bushels shelled corn, four acres of which, with extra preparation, produced four hundred and sixteen bushels.

It will never do to carry seed corn from South to North, as it will not mature in a higher or colder climate than that from which it has been taken. Even half a degree of latitude sensibly affects the maturing of the blade, and renders it an uncertain crop, in our high northern latitudes. To insure an extra yield of this valuable grain, the soil must be highly manured, deeply ploughed, thoroughly cultivated and hoed, and top-dressed with lime, house ashes, and plaster. This done, it is the most remunerative and profitable of all our grain crops.

The shuck or fodder will pay the harvesting of the crop, and is worth on each acre more than a ton of good hay for milch cows or young cattle. Although large crops of this grain are annually obtained by some of our best farmers, and might be by all with proper management, yet the average per acre for Vermont does not probably exceed forty bushels; and at this rate it is profitable, so valuable and important has it become as food for both man and beast. The average product per acre of all kinds of grain cultivated here is rather on the increase; farmers are awakening to their true interests, and as railroads progress, opening new avenues to the fertile regions of the west, we find that we must compete in our eastern markets with our western brethren, laden with the products of their cheap and virgin soil; and the necessity imposes itself upon us to make the most of our resources, which are ample and at our command, if we will but improve them. Vermont will, in the coming census, in my opinion, retain the position in which the statistics of the last census placed her, at the head of the Union in agricultural products, in proportion to area and population.

In feeding grain to cattle it should always be ground, and to hogs not only ground but cooked; to horses and sheep it is not so essential; they masticate it more, and it is seldom we see any undigested food pass from them. The standard of grain weights for Vermont, are: wheat, sixty pounds per bushel, rye and corn, fifty-six pounds; oats, thirty-two pounds; and the average weights of these grains will overrun the legal standard, thus showing our soil and climate adapted to their growth and perfection, with the exception, however, of wheat, in the production of which we must yield the palm to the West. The cost of labor for grain crops varies in proportion to quantity obtained, and no very accurate estimate can be given. It costs nearly the same labor to get a *small* crop that it does a *great* one, and the cost per bushel is diminished in proportion to the increase in the number of bushels. My own experience teaches me that Indian corn and rye can be produced, including interest on land, fencing, taxes, and all other charges, at forty-five cents per bushel, oats at twenty-five cents, but the uncertainty of the wheat crop will render the average cost on our old lands, I think, as high as one dollar per bushel.

The *hay crop* is very important and essential in this high northern latitude.

A mixture of clover, timothy, and red-top, is considered the most valuable; one ton and a half per acre an average, though on our best lands we get two to three tons per acre, and a second crop in September, if we choose. *Roots*, except the potato, are not much cultivated, and the malady has greatly diminished their culture, though the last season has been more favorable than the preceding ones, and a fair crop in *quality* was realized, though not in *quantity*. Dairying and the raising of cattle and horses are on the increase in Vermont, and they find a ready market at Boston and its vicinity, where they stand high for their excellence. The Vermont horses of the *Morgan* breed are not surpassed in the known world. Of the improved breeds of cattle, the Devons are preferred, as being hardy, close and compact, good feeders, beautiful in form and color, and well adapted to the dairy, to the yoke, to the stalls, and to the rigidness of our climate.

Sheep Husbandry, I regret to say, is diminishing in consequence of the low prices of wool under our present tariff, which fosters a foreign competition in all woollen fabrics, and in the production of wool. This once great source of wealth to Vermont, I fear, is destined to be annihilated, and we are again to become dependent upon *foreign workshops* for our clothing, one of the essential necessaries of life. Vermont once numbered nearly one and a half millions of sheep, which have dwindled down, probably to about half a million, averaging about three pounds wool per head, ranging in quality from half to full-blood merino. Cost of keeping per annum, one dollar fifty per head. We find a ready sale for our wool at whatever the article is worth, to the manufacturers in this and the adjoining States. Cost of making pork here is six cents per pound, and but very little done above domestic wants. Cost of farm-labor seventy-five cents per day, or fifteen dollars per month, with board, which is worth one dollar fifty to two dollars per week, though in some parts of the State both labor and board may be lower.

Plaster, Lime and Ashes are considerably used as fertilizers, and with success. Orcharding of grafted winter fruit is receiving much attention; trees are transplanted both fall and spring; the latter, however, is considered the more favorable time. I would remark that the apple crop proved a total failure here last season.

Yours, with due respect,

J. W. COLBURN.

Hon. Thos. Ewbank,
Commissioner of Patents.

Richmond, Mass., *December* 1849.

Sir:—In giving agricultural statistics there is almost uniformly a great error committed in not noticing the soil, climate and local position of the territory whose products are enumerated. For example, one individual speaks of a remarkable crop in his neighborhood, and his statement to those of other and less congenial localities looks extravagant, and it may be they consider the whole statement a fabrication. In another instance, a farmer may raise what appears to him, and in reality is a fine and profitable crop for his section: one for which he is perhaps entitled to much credit for skill, and yet in another region this may be looked upon as a very slim product; perhaps hardly worth the labor of ingathering. So it will be seen, that in order to

make a fair estimate in these matters, *causes* concurring to produce effects should be discovered in order to have those effects appreciated at their true value.

With this view of the matter, I have thought proper in speaking of the agricultural products of western Massachusetts, of the current year, to advert briefly to our geographical position, the nature of our soil, &c., hoping that if my effort does not interest *all* your readers, it will some, who will in their turn give us like particulars, more interesting if they please, of their own surroundings.

First then, our geographical position. The south line of the State is on 42° 2′ 59″ 54‴, the north-west corner is on 42° 44′ 45″ 58, by the trigonometrical survey of the State, published in 1846. The western line of the State runs on a range of mountains running in a south-west and north-westerly direction. This range is composed principally of talco-micaceous slate, though not in so great quantities as in any way to hinder its cultivation. The slope of the mountain towards the east is gradual, and many fine farms, both for grazing and grain, are spread over its eastern declivity. The height of the range is various, some of its highest points being three thousand feet above the level of the ocean.

On the east, a continuation of the Green Mountain range divides the valley of Berkshire from that of Connecticut River. This mountain on the north rises more than two thousand feet. Passing southerly, the elevation is less, and the surface better adapted to cultivation, though its principal value is for grazing. The prevailing rock of the mountain, in the northern part of the State and on the eastern declivity, is mica slate, while its western and southern material is composed to a very great extent of quartz rock, intermingled occasionally with chlorite, steatite and gneiss, the two former in moderate quantities. Between these two mountains, the Green and Taconic, opens the beautiful valley of Berkshire, extending north-east and south-west through the whole length of our territory. Along the centre of the valley rise several mountains, some of them abruptly, to high and giddy elevations. On the north, and foremost in rank, old Greylock, the highest land in the State, lifts its storm-defying head, and looks down upon all the lesser hills around as his younger brethren. It is a feature in all our central mountains and hills that they are high and abrupt at their northern points and slope off gradually towards the south. These central mountains are uniformly composed of mica slate, except Monument Mountain, in Stockbridge, where basaltic rock prevails.

Such are our mountains, the birth-places of a thousand little rivulets, that come jumping and skipping down their sides, giving melody to the music of birds, and bearing in their course the disintegrated portions of the rocks and deposits of the forest, to fertilize and enrich the teeming lands below. The prevailing rock of the valley is primitial limestone, running into every variety, from mouldering dolomite to the most enduring marble. Here, too, iron ore is found spreading itself in veins through the length, and from the discoveries that have been made, the breadth of the valley. Such are the prevailing geological features of our country, and it is to the decomposition and intermingling of the substances of these minerals with the primitive earths, aided by the vegetable matter accumulated by time, that our soil is indebted for its natural fertility.

The soil of Western Massachusetts is of a happily varied character. Clayey loam probably predominates. This is frequently two and three feet deep,

and is usually based on a clay subsoil. Sometimes it is not more than twelve or fifteen inches to this impermeable bottom, and sometimes, where the skinning system has been pursued, it rises to the surface and warns its owner to "seek another and a better country," or apply his mental and physical energies to resuscitate the one he possesses. Then we have our gravel loams, our sandy loams; our pure gravel and pure sand plains. In fact, our soil runs into rich variety, and almost every hundred acres has a share in some two, three, or more of them. Thus much for the general character of our soil; and here we may as well, as anywhere, speak of the means employed for its improvement. Barn and stable manure of course is, and has been from the beginning applied to this object. But the supply of this is inadequate to the demand, and farmers are making the most of it in many cases, that economy will permit. Barn cellars are found favorable to this object, where it is sheltered from the storms and wasteful winds. The quantity is much increased by drawing muck from the pond-holes, which are abundant, and saving and incorporating all decomposable substances. These composts are valuable as top-dressings to grass, and on many soils for ploughed crops.

Ashes are sought for eagerly, and given to the land with great profit. Lime is used some, but the price which the market warrants forbids its general application, though its good effects, in due time, are unmistakable. Plaster of Paris (gypsum) is valuable on all lands dry enough to plough, and is probably used in the county to the amount of three hundred tons in a year, at a cost of seven or eight dollars a ton at the mill.

Ploughing in green crops is a practice gaining ground from its observable good effects.

But there is another renovating process going forward, which is probably superior to all others; at any rate, without it, all others will in the end fail. *Deeper ploughing*, bringing up soil to the influence of the sun and air, which has long been excluded from them, is gaining ground, and better harvests tell the story of its virtue.

The climate of Berkshire is one of stern realities. More than forty-two degrees north, and in the hilly country of this high latitude, our lowest point more than six hundred feet above the ocean, it may well be supposed we often hear the rattling of hail and feel the pinching influence of early and late frosts. A few of our late seasons have, to be sure, been less rigid in their character, but we have known more than one winter set in in earnest early in November, and eight long months of foddering ensue. More recently, however, sheep and neat cattle need but little care until the middle or last of that month, and sheep are turned off in April, sometimes the first, and from that to the twentieth. The present season, with the exception of cows and animals employed for labor, stock does very well out to December.

And now with regard to your circular; and here permit me to say, that although the spring came on favorably early, and from its moisture promised favorably to the grass and grain crops, our farmers were doomed to disappointment in some of these by the pinching drouth of June and July, which were actually dryer than any two corresponding months we have ever known. For the quantity of rain in these and subsequent months, we refer you to our notes in the Smithsonian Institute, transmitted monthly.

Wheat.—The variety mostly cultivated is the Spring Black Sea. It is among the most hardy varieties, but little subject to rust, not proof against

insects, but troubled less by the midge than most kinds. Its common weight is sixty, and if first rate, sixty-two and sometimes sixty-four pounds per bushel (sixty pounds is lawful weight). The quality of the flour depends much upon the character of the land on which it is raised; on a slaty or sandy soil, it is white and good. Soil appears to affect this more than any variety of grain we know of; rust, midge (sometimes called weevil) and improper culture are the worst enemies to the wheat crop.

The former may be often guarded against by selecting porous soils. We have found sowing plaster on the crop when the wheat was in blossom, a check upon the midge. Any dry porous soil will produce wheat, if other qualities are equal. Our best farmers prefer applying their manure to a previous crop and putting the land in clean condition. Hot fermenting manures should be avoided the season of sowing, unless the land is cold and inclined to moisture. On many lands we have successfully applied barn-yard litter, containing but little manure, as a top-dressing.

Oats.—The quantity sown, about the same as last year, but the crop diminished one-fourth at least by drouth. Their value compared with corn, if the market prices are reliable tests, is as four to seven, legal weight thirty pounds per bushel.

Rye.—Mostly used as a breadstuff and for feeding, though we have one or two whisky distilleries that consume more than their proportion. More was sown this than many previous seasons, which all looks well. The last crop was good; cause, improvement in the soil and proper care in getting in the crop.

Barley.—No important change from last year; a good crop; adapted to our soil and climate; used for feeding.

Indian Corn.—The varieties raised are very numerous. It changes its character by change of climate and even soil—will bear bringing in from the north much better than the south. Time of coming to maturity depends on soil and time of planting, but principally on soil and culture—crop suffered from drouth this year—ears not as long nor as well filled as usual—legal weight 60 lbs. per bushel.*

Root Crops.—The potato crop has been the best for many years—there has been but very little of the scourging rot, and potatoes are of good size and fine quality. We hope the evil of past years has passed away to afflict us no more. We have seen the yield per acre reach in some cases four hundred and six hundred bushels. If they have averaged two hundred bushels per acre, we will be agreeably disappointed. The price has varied from twenty-five to forty-four cents per bushel. Other root crops raised in small quantities—their value not appreciated.

Hay.—A mixture of herds-grass and red top, we think, makes the best hay for all kinds of stock. Grass was lighter the present year in consequence of the drouth. We occasionally see a meadow irrigated sometimes with good and sometimes with bad success. When very cold water is turned on and allowed to remain, its effects will in time be fatal.

Butter.—An increase in quantity, probably of fifteen per cent., average price sixteen and three-fourths cents, lowest price fourteen cents—market in the county.

Horses.—None raised for foreign market. Price varying according to

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* Cost of raising various grains given in my communication of last year.

quality. Ordinary worth from forty to seventy-five dollars, and price increasing according to value.

Cattle.—Taking the additional number of calves raised into account, there is probably an increase of one-third from last year. Beef principally consumed in the county. Devons and Ayrshires are best suited to this region.

Sheep.—The low price of wool in former years has somewhat reduced the number, though farmers are more eager to keep them than they were a year ago. The Merino and Saxon races still prevail, though the Southdown and Tees-water are found more numerous than formerly. The average weight of fleeces varies in different flocks of the same race. Saxons two and a half to three pounds. Merinos three to three and a half pounds. It is worth one dollar and fifty cents to keep a sheep a year, and costs many, taking interest on value of land, more than that. Market in the county. Have a wool-depot which has its favorites and its opponents. We have sought the opinions of several intelligent farmers as to the number of sheep killed by dogs in a year, and have heard no one put it down at more than one in four hundred; we will, however, to gratify dog-hatred, say one in three hundred, which is a number far less than those stolen and killed by worthless vagabonds of the human species. Probably not more than one dog in seventy-five is guilty of this outrageous practice, and not more than one man in a hundred but is ready to kill his dog when found guilty of so base a misdemeanor. The prices of wool have advanced from last year. At clipping time, it sold at from thirty to forty cents per pound, and has advanced since some ten or fifteen per cent.; the quantity in the hands of growers is small.

Hogs.—The average weight at eighteen months old is probably three hundred pounds, though many spring pigs are made to approach that weight. No man in this region can produce good pork for less than six cents per pound.

Labor.—Men get from ten to sixteen dollars per month and boarded, for six months commencing in April.

Orchards.—We have two sorts of cultivators, one of which must have things *done*, whether any good result follows or not. This class set their fruit-trees in little cramped pits, tumble earth, stone and turf promiscuously upon the roots, and then if the trees do not live and bear fruit the second year, they conclude it is of no use for them to attempt to raise fruit, as their soil, the climate, or some other sad obstacle prevents them. It is no wonder their trees die; many are annually lost by this practice. Then we have another class who do things with care. They dig pits perhaps six feet in diameter and two feet deep, and have a supply of compost at hand to mix with the earth, when it is replaced. Their trees are taken up and set out with care, and the nice fine rich earth placed around them; it is no wonder they grow. Then, again, this class of cultivators obey the Scripture injunction to dig about and dung their trees when necessary, and see themselves compensated for all their trouble. These men seldom lose a tree, seldom have a sickly one. An excellent practice also prevails of washing the trunks of fruit-trees with a strong lye. It destroys insects, and gives a fresh healthful appearance to the bark. The valley of Berkshire is well calculated for raising the finest apples and pears. Plums do well here, and peaches and cherries can be raised with care, unless the seasons are *very* unfavorable. There have been good crops of peaches the past season. Much attention is paid to putting out fruit-trees, and this region will eventually become famous for fine fruits.

Stimulants to exertion.—Berkshire county has two agricultural societies: "Berkshire County Society," founded in 1811, and "Housatonic Society," founded in 1842. Each society has about three hundred members, and funds to the amount of three thousand dollars. They are both under the patronage of the legislature, and draw from the State treasury to the amount of six hundred dollars each, which amount is given with additional sums from interest on funds, in premiums. We have also a County Horticultural Society, which, though of recent formation, is exerting a good influence in introducing richer fruits, more beautiful flowers, and new and healthful vegetables. The utility of its objects are taken as a sure guarantee of its success.

Yours, truly,
WILLIAM BACON.

Hon. Thomas Ewbank,
Commissioner of Patents.

Vue de l'Eau, Bristol Co., Mass., *December* 23d, 1849.

Sir:—We have received in this section of Mass. from your predecessor, the Hon. Edmund Burke, and from our former representative from this district, Hon. Mr. Hale, our full share of the interesting and useful Patent Office Reports for 1847–48, for which we are greatly obliged. I have also received a circular for 1849, to which my attention has been very kindly solicited.

By the acts of the royal commissioners appointed by the King of England to settle the boundary line between Massachusetts and Rhode Island in 1741, a part of the ancient county of Bristol, comprising what are now the flourishing towns of Little-Compton, Tiverton, Bristol, Warren, and Barrington, justly denominated "the garden of the old colony," was unfairly severed from Massachusetts, and by a subsequent decree annexed to Rhode Island. But though Bristol county was then despoiled of a part of her most valuable territory, she has since made vast strides in improvement, and is still rapidly advancing in prosperity. She has now within her limits one populous and flourishing city (New Bedford) and eighteen large villages. The soil, like most of New England, is perhaps not the *best* in the known world; and in the interior of the county it is rather sandy and sterile, and some of it, like New Hampshire, abounds in rocks; yet, taken as a whole, it is luxuriant, and for the beauty of the scenery, the enterprise of the inhabitants, and the salubrity of the climate, Bristol is probably not surpassed by any other county in the commonwealth.

Within its present limits are about fifty cotton factories, where are annually made more than nineteen million yards of cloth; four calico factories; three woolen mills; three forges; seven rolling, slitting, and nail mills; fourteen furnaces for the manufacture of hollow-ware; ten establishments for the manufacture of cotton, woolen, and other machinery; five axe factories; one steam-engine factory; two establishments for manufacturing cutlery; five tack and brad manufactories; six shovels, spades, forks, and hoes, do.; one plough factory; one copper do.; one Britannia ware do.; one metal button do.; one glass do.; three paper mills; two clock factories; twelve establishments for the manufacture of chronometers, watches, gold and silver ware, and jewelry; six brass foundries; eighteen saddle, harness and trunk manufactories; one upholstery do.; three hat and cap do.; one cordage do.; seventeen salt do.; eighteen oil and sperm

candles do.; nine soap and candle do.; thirty-eight carriage do.; fourteen chair do.; two comb do.; one linseed-oil mill, and twenty-three furnaces. During the past year, there have been manufactured in this county one hundred and forty-seven thousand seven hundred dollars worth of straw bonnets; five thousand dollars worth of cigars; twenty-seven thousand dollars worth of building-stone; twelve thousand two hundred dollars worth of marble quarried; fourteen thousand eight hundred and twenty-five dollars worth of wooden-ware manufactured; five vessels launched, valued at fifty-five thousand dollars; and we have three hundred and twenty-two vessels employed in the whale fishery. It is estimated that there are in this county thirty-one Saxony, seven hundred and eleven Merino, and nine thousand one hundred and forty-four sheep of other kinds; five thousand three hundred and forty-two horses; fifteen thousand two hundred and eighty-five neat stock; and that our county annually produces one hundred and thirty-nine thousand three hundred and ninety-two bushels of corn; fifteen thousand one hundred and sixty-five bushels of rye; forty-six thousand seven hundred and eighty-nine bushels of oats; four hundred and twenty-nine thousand four hundred and twenty-nine bushels of potatoes; seventy-seven thousand bushels of esculent vegetables; sixty-five tons of millet; twenty-four thousand nine hundred and eighteen tons of hay; one hundred and twenty-six thousand bushels of fruit; three hundred and twenty-three thousand pounds of butter; one hundred and fifty-eight thousand pounds of cheese; one hundred and fifty-two thousand five hundred and fourteen gallons of milk; and one thousand two hundred and seven pounds of honey.

From the above, it will be perceived that a large share of the population and capital of the county is employed in other pursuits than that of agriculture. But this all-important interest is beginning to receive increased attention, not only in Bristol, but in the adjacent counties, and throughout the whole State. Those portions of Bristol county bordering on Narragansett, Mount Hope, Acushnett, and Buzzard's bays, and on the rivers flowing into the same, are among the most productive and fertile. Some other sections, however, present many of the finest specimens of highly cultivated lands. There is not much wheat sown in the county, and the quantity of oats grown for the past few years is much less than formerly. The reason assigned for this by one of our best farmers is, that these crops exhaust the land more than others. In this vicinity, rye has suffered somewhat from the severity of the two past winters; but I am not aware that there has been any material diminution of the crop, or in the fertility of the soil on which it has grown. For barley, our soil and climate are considered well adapted, but for some reason unknown to the writer, this grain is very little cultivated, and it may almost be said of it, "men sow not, neither do they reap."

Maize, Indian Corn.—In this county and State much more attention is now paid to the cultivation of this grain than formerly; more land is appropriated to it, and by far greater crops are produced. The idea that it is cheaper to buy corn than to raise it is fast becoming unpopular; and the two last seasons have proved very favorable to its production. The average yield per acre was, a few years ago, not more than fifteen or twenty bushels in this part of the State; now, fifty and seventy-five bushels are not uncommon, and it is probably safe to estimate the average at from thirty to forty bushels. Green corn for soiling cattle is highly esteemed, especially for producing milk; and the corn ground into meal is deemed much more

profitable for feeding to stock than the whole grain. The probable aggregate product of the State is about two million bushels of corn; forty-eight thousand bushels of wheat; four hundred and fifty thousand bushels of rye; one million two hundred thousand bushels of oats; thirty-two thousand three hundred bushels of buckwheat; corn and rye, by statute, weigh fifty-six pounds to the bushel; barley and buckwheat, forty-six pounds; oats, thirty pounds; and wheat, sixty pounds.

Hay.—Timothy is deemed the most desirable and nutritious kind of hay, when not mown until after the blossoms begin to turn, and the seed to form. Clover and mixed hay are also considered very valuable for stock. In laying down meadows in spring, clover, timothy and redtop mixed, are usually thought best. When sown in autumn, the clover is generally omitted. One ton per acre is about the average yield.

Potatoes.—The past season has been more favorable for the growth of potatoes than that of 1848, and on account of their high price for a few years past, there probably has never been so large a quantity raised in this county in one year before. Although the aggregate crop has doubtless been eight or ten per cent. greater than the preceding year, yet much damage has been sustained from the disease. The average yield is about one hundred and fifty bushels per acre. The crop suffered much from dry weather in June and the early part of July, but those planted early and covered deep, yielded the best, and grew to the largest size.

Butter.—About eight million pounds of butter are annually made in Massachusetts. Good cows produce about six pounds per week, for from three to six months. The average annual produce from each cow varies from seventy-five to one hundred and fifty pounds. Clean, well-ventilated cellars, with stone or cemented floors, are considered by butter and cheese manufacturers as good as spring-houses.

Not many horses or mules are raised in Massachusetts. There are now in the State fifty or sixty mules, and about seventy thousand horses, the average value of which is about seventy-five dollars; some are worth but forty or fifty dollars, others range from two hundred to four hundred or five hundred dollars. Our best, most valuable, and beautiful animals are from Vermont and New Hampshire.

Of horned cattle we have about two hundred and eighty thousand in the State, worth when three years old not far from fifteen dollars per head. The pure Devon and Ayrshire are preferred. The writer of this has some Durham and Galway stock, which are very highly esteemed, and in some respects deemed superior to those above mentioned.

Sheep Husbandry.—There are not many Saxony, but more Merino sheep in this State than of any other race. Amount of wool clipped in the year is about one million and twenty thousand pounds. Average weight of fleece three pounds; price varies from thirty-five to fifty cents per pound. It is not known that they are often molested by dogs, but for various reasons, this branch of industry has never been very extensively prosecuted in Massachusetts. Plaster and lime are but little used as fertilizers in Bristol county. The farmers rely more upon compost and stable manures, and the various marine substances, such as sea and rock-weed, or kelp, &c.

Orchards and Fruits.—I have only time to add that great and increased attention is being given to cultivation of all kinds of fruits. Farmers are beginning to see the importance of raising fruit for the market, and in the suburban districts are already realizing considerable income from this branch

of industry. The beautiful specimens of fruit at our Agricultural and Horticultural exhibitions very clearly evince the growing importance everywhere attached to the selecting and planting of orchards and trees, and to all that pertains to the advancement of Horticulture.

In conclusion, allow me to say that I have forwarded copies of your circular to my very worthy and distinguished friends, and neighbors, the Hon. Tristam Burgess, and Captain Martin Page, both of whom are scientific and skillful agriculturists; and I trust they will furnish you with more accurate and acceptable information than is contained in the above report.

With great respect,
I have the honor to be
Your obedient servant,
JOHNSON GARDNER.

Hon. Thomas Ewbank,
Commissioner of Patents.

Western Congressional District,
North Kingston, R. I., *Dec.* 1849.

Sir:—This State is divided into two districts, by a line passing through Narragansett Bay, from north to south. This district is composed of the counties of Washington and Kent, and parts of Newport and Providence counties. As no estimate of the agricultural products has been made since the census of 1840, I have no data to predicate an opinion, or sufficient information to give a statistical account of the recent crops with any degree of accuracy, and shall therefore confine this communication to some remarks on the season, the soil, and such crops as are usually cultivated.

The land on the seaboard in its primitive state was very productive and easily cultivated; and it appears that the original proprietors formed the same opinion of the durability of the soil that many do at the present day, who have located on the fertile lands of the west, that the soil is inexhaustible, and will never need replenishing. They pursued the exhausting system of cropping without manure, until the products would not pay the labor, and would then flee to new regions to obtain a subsistence. But since the commencement of the present century, a spirit of improvement has been manifested in replenishing and fertilizing the worn-out soil. The tide of emigration has been very much checked (with the exception of the California fever, now carrying off some of our population), and the state of agriculture has received a new impulse. It is the opinion of our oldest and best-informed citizens that the agricultural products on the seaboard have increased more than one hundred per cent. within forty years. Great attention is now given to making and saving manures. Many farmers think as much of preparing the compost heap for the spring as they do of securing the crops in autumn. This district has more than one hundred miles sea-coast, including two islands that form townships. Large quantities of marine substances are annually thrown upon the shores, which formerly were considered of but little value, but now all are husbanded to the best advantage. Our bay abounds in menhaden fish, which are taken in great quantities, and converted into a very fertilizing manure.

The Seasons.—The spring opened earlier than usual. The farmers commenced operations in March, but the latter part of the month was very rainy and blustering. April was favorable for getting in early crops;

rather pleasant, with a medium quantity of rain. May was very rainy, accompanied with cold, chilly winds and little sunshine, but no frost. The forepart of June was showery and cool till the 10th, when the atmosphere became serene and warm, and vegetation came forward rapidly until it began to feel the want of rain. July came in hot and dry, and it continued so through that month till the 10th of August, which occasioned the most severe drouth that has been experienced in this section for many years. Not more than *one inch* of rain in sixty days; and for a number of days in succession the mercury rose to 95° in the shade, extreme height 100°. From August 10th to the close of the season, there was no lack of rain for vegetation; but the streams remained low till the middle of October. The autumnal months have been very favorable for maturing late crops and securing the harvest. The first killing frost was October 15th; and the ground was not frozen sufficiently to obstruct the plough till December.

Crops.—Wheat, barley, and buckwheat, not raised to any extent worth noticing. *Oats* are raised in small quantities, but considered an unprofitable crop. Average yield twenty bushels per acre. Price about forty cents per bushel.

Rye has received increased attention within a few years. Many farmers who formerly raised none, have had crops of thirty or forty bushels per acre. Within the last ten years, the production of this article has nearly doubled. Average yield not exceeding fifteen bushels per acre. Fall sowing does best; usual time September, and harvest in July—seed one bushel per acre. Domestic price one dollar.

Indian Corn is more extensively raised than any other grain crop. The white variety is mostly cultivated, and invariably commands a higher price for breadstuff than the yellow. Time of planting, the last of April and first of May. Harvesting depends very much on the season for ripening, usually the first of October. Average yield per acre on the seaboard thirty-five bushels—but in the interior considerably less. Our farmers have competed for premiums with crops from eighty to over one hundred bushels per acre. The crop the past season was fifteen per cent. short of an average, occasioned by the severe drouth. On clay or gravelly portions of the fields, it was a total failure. The price ranges from seventy-five cents to one dollar; at present eighty cents.

Potatoes have been more extensively cultivated since the appearance of the disease than before. Notwithstanding some localities have been severely affected by the malady, yet on the whole, in a pecuniary point, we are the gainers. Our farmers realize more from the sale of potatoes than any other crop they produce. Previous to the rot, the price was from twenty to twenty-five cents per bushel; but since, it has ranged from forty cents to one dollar, and in some instances still higher. Average for the last six years not far from sixty cents. It is estimated that the whole loss since the commencement of the disease will not exceed twenty per cent.; while the price has advanced one hundred and fifty per cent., and quantity produced greatly increased. Our proximity to navigable waters gives us a very favorable location for the potato trade, as we have but little land carriage. It is estimated by competent judges that the product over the consumption for the last five or six years has been more than one hundred thousand bushels annually, which have commanded good prices and a ready sale in other markets. The crop the past season suffered less by the rot

than in any previous year since its appearance; but owing to the severe drouth and extreme hot weather, was at least thirty per cent. short of an average, which is about one hundred bushels per acre. Time of planting from the first of April to the last of May. Early planting is now preferred, as the crop is more liable to escape the blight. Seed per acre from ten to fifteen bushels.

Root Crops.—*Turnips, beets, and parsnips* are raised for culinary purposes, and the former by some farmers for feeding; but the turnip is considered more valuable for stock than any other root. The cultivation of onions is on the increase. They are raised in fields from four acres down to a garden spot. On a loamy, moist soil, well manured with good tillage, the average yield is four hundred bushels per acre; but nearly double that yield has been reported to the Agricultural Society; customary price forty cents per bushel, but owing to the short crop occasioned by the drouth, they are now selling at fifty cents for shipping. Some attention is given to the field culture of carrots. This crop requires a sandy, deep soil, and not very moist. Average yield five hundred bushels per acre, and some extra crops over one thousand. Average price twenty cents per bushel. Some of our root-cultivators raise onions and carrots together in alternate rows, and get larger crops than when grown separately.

Hay.—The early drouth the past season cut this crop short twenty per cent., but the favorable weather for curing it gave us an excellent quality, which in a great measure will make up the deficiency in quantity. Average yield nearly a ton per acre. Some meadows highly manured produce three or four tons per acre. Price from twelve to fifteen dollars per ton.

Fruits.—Increased attention has been given to orcharding within a few years, and especially to the improvement in the quality of fruit. Apples, pears, peaches, plums, cherries, &c., are raised in fruitful seasons, in sufficient quantities to supply our domestic markets.

Dairy.—Our farmers are not extensively engaged in this branch of husbandry. Butter and milk for the supply of our villages and seaports are the principal articles in the dairy line. Very little cheese is made for market, but many farmers make their own family supply. The average yield of cows about thirty dollars a season, but some forty or fifty dollars. The price of butter will average twenty cents per pound.

Stock.—Cows compose the bulk of our stock. The calves are mostly slaughtered at four weeks old; but a small part are raised, which makes us dependent on other States for a supply. Herds of young stock are brought in by drovers, and sold to our farmers at a price below the cost of raising here. The profit of a cow one season will purchase two head of young stock two years old, which if the farmer had to raise, would deprive him of the use of a cow two years.

Oxen and horses are kept for domestic purposes. Most of the farm teaming is performed by oxen, and the manufacturing teaming by horses. Average price of cows twenty-five dollars, oxen thirty dollars a pair. Sheep are on the decrease, being less profitable than cows.

Swine.—Nearly every farmer produces his own pork, and some to supply the domestic market, but none for export. Price by the whole hog, from six to eight cents per pound.

Poultry is raised by nearly every farmer, and considered a profitable branch of business. Over and above our domestic consumption, it is estimated that more than one hundred tons are annually sent to Boston, and

other markets. Eggs are produced in abundance. Domestic prices of poultry ten cents per pound. Eggs twelve and a half cents per dozen.

Wages.—Farm labor by the season from twelve to fifteen dollars per month, and board. Mowing one dollar per day. Mechanics from one to two dollars per day. Female domestics one to one dollar and a half per week.

Agricultural Society.—The Rhode Island Society, for the Encouragement of Domestic Industry, was incorporated in 1820. During the first twenty-five years of the existence of this society, its benefits were duly appreciated by the agricultural community. The liberal premiums annually offered created such a spirited emulation amongst our farmers, that soon a new system of agriculture was substituted for the old traditional customs. But, for the last three or four years, the exhibitions have been less attractive, the displays at the fairs much diminished, and many premiums offered without a claimant, which is shown by the enclosed report, made by one of the committees, that had the disposal of two hundred and thirty-one dollars in premiums, and only thirty-five dollars claimed, and that without competition.

This falling off is attributed more to the want of novelty than the lack of enterprise. The sameness of the exhibitions has caused such a careless indifference that but little benefit results from the annual fairs, for which reason none was held this year. I have heard of no complaint against the officers of the society, and am fully confident that they would rejoice at the opportunity of distributing the annual proceeds of the fund, if it was only sought for and duly appreciated by those for whose benefit it was designed. The society has real estate which cost five thousand dollars, and a permanent fund of eleven thousand six hundred dollars, well invested in bank stocks that pay from six to seven per cent. Officers of the society, Hon. John Pitman, President, and Elisha Dyer, Jun., Secretary. Both reside in Providence.

Yours, very respectfully,
J. G. CHADSEY.

Hon. Thomas Ewbank,
Commissioner of Patents.

New Lebanon, N. Y., *January* 15*th*, 1850.

Sir:—Your circular requesting statistics of agricultural products, improvements, &c., was seasonably put into my hands for report thereon, and ought to have received earlier attention, but circumstances beyond my control have delayed my efforts until the present moment; and I am not now able to do justice to the cause, or to the public, but will, nevertheless, make out statistics relative to such points in your circular as the society of Shakers located in this town are best able to attend to. The Shakers, moving as they do, in a body, in all business of importance, improvements are slower of introduction among us than among individual farmers in the country generally; but we think we can say, nevertheless, that when an improvement is once thoroughly introduced, it is perhaps more permanently maintained.

The arable lands belonging to this community are, in the main, located on the west side of a mountain, of such steep declivity that those situated above the village (which is situated about midway the descent on a narrow table of land) are inaccessible to manuring, except with green crops; hence there is not, on the whole, any essential improvement of these portions of our

possessions, some sections improving in value by judicious treatment, of turning in green crops, rest, limited depasturing, &c. &c., others more closely cropped and less judiciously managed are deteriorating. The soil is generally what would be properly called an argillaceous loam of moderate tenacity, varying generally from three to nine inches in thickness, and resting upon a hard pan, moderately penetrable with the plough, and susceptible to conversion into soil by trench ploughing, exposure to atmospheric influences, and the action of animal or vegetable manures. It is retentive in a moderate degree, and susceptible of great improvement. The soil is principally adapted to wheat, and some sixty years since as large crops of wheat were taken from it, perhaps, as from any in the State of New York, thirty bushels to the acre being a very common yield, and sometimes sixty bushels to the acre have been raised, and that within twenty years past; but the average of wheat was formerly perhaps about twenty bushels—and some crops of late years would average nearly as much, but at present wheat seems to require manure to stand the winter and make a good return, and, as the attention of the society is much engrossed in horticultural pursuits, raising garden seeds and herbs for foreign markets in the States and in Europe, the manures are chiefly expended upon the gardens, somewhat to the detriment of the farm as a whole. Therefore wheat is now seldom cultivated.

Oats are raised extensively, and their cultivation is becoming, on the whole, rather more popular, although some portions of the community, perhaps, raise less than formerly; with improper management they seem to be a scouring crop, but when suitable attention is paid to prepare the soil by grass lays, green or dry, the latter of which is preferred, the soil seems not to be essentially drained; and as oats generally give a fair return on thin soil, they are much cultivated, and used to mix with barley and corn, in equal proportions for provender. They are also used clean, for horses principally, as corn is considered with us too heavy for that purpose.

The different kinds cultivated are the common or tassel oat, the barley oat, and the black oat. The two latter kinds, though making the greatest yield in some sections, seem more inclined to lodge and injure by rust, and are consequently slow of introduction.

Opinion is conflicting as to the merits of the different varieties; the common oat, however, is generally preferred. The average yield is from thirty-five to forty, and sometimes fifty bushels to the acre, generally sown on green sward turned late in the fall, and simply harrowed, but generally with less success. As to the value of oats, compared with other grain, no accurate experiments have been made, as with us they are generally fed mixed with barley and corn. Two bushels of oats are generally considered rather better than one of barley as feed; though in the market one bushel of the latter grain is worth more than two of oats. From three to three and a half, and even four bushels are generally sown here to the acre. The comparative value of corn and oats is as one to three.

Rye is very little cultivated; most of the lands belonging to the society will not grow it to advantage. There are crops, however, sown upon some sections of our lands annually, which yield an average of twenty bushels per acre. No essential diminution of crops has been observed of late. It is entirely consumed at home, and mostly for bread.

Barley.—This crop is extensively cultivated here, as it gives a better return for labor on land of moderate strength than any other small grain, and is the very best for seeding with grass, as it comes off so early in the season,

usually about the middle of July. It is much used in our State for the manufacture of ale. But our society not consuming this, or other fermented or spirituous liquors, it is exclusively used as provender. The four-rowed and the six-rowed are both cultivated among us, but the latter much preferred.

In our system of rotation, barley always follows a hoed crop, as it seems to do best on a subdued soil, and it will even make a better return on the poorest of land succeeding a crop of oats, than on a green sward reversed. Of course, the yield varies with seasons and soils: with us for fifty years past it has ranged from thirty to eighty bushels per acre, and has averaged forty-five during that period.

Maize.—As to varieties they are so fluctuating as hardly to be recognizable; the kinds cultivated here are usually of northern origin, or such as belong to the Middle States. Northern or Canada corn for early or green corn, and the other kinds for the main crop. The eight-rowed, and twelve-rowed varieties are mostly used. A kind called Dutton is in most esteem just now, as it ripens some days earlier than any other variety of equal growth and weight with which we are acquainted. This grain, according to our experience, is liable to great changes of character from the action of soil, climate, and manures; a warm, quick and strong soil, so materially hastening the growth and maturity, as to make it difficult to recognize the same variety when grown on different soils. We have two modes of culture:—1st. A green sward reversed with compost broadcast, and well harrowed. 2d. Fresh or long manure spread on the sward, then ploughed, harrowed and rolled. Manure at the rate of thirty-five or forty cart loads to the acre. The young plants are dressed with unleached ashes, and if in slaty or sandy soils, with plaster. Our clay soils generally are very little benefited by plaster, whereas the product of our slaty hill-sides or gravelly and sandy knolls is nearly doubled by its application.

As regards the comparative value of shuck and blade, we are not prepared to offer an opinion. The stalks well cured and chopped are considered for cattle equal to a medium quality English hay. As they frequently mould in curing, they are not given to milch cows, as they might communicate a disagreeable flavor to the milk, and they are fed to young stock and dry cows. Green corn for soiling, especially milch cows, is considered superior to any other forage; but we are unable to state its value as compared with clover and grass.

The experience of more than thirty years leads us to estimate *ground corn* at one-third higher than *unground* as food for cattle, and especially for fattening pork; hence it has been the practice of our society for more than a quarter of a century to grind all our provender.

The same experience induces us to put a higher value upon cooked than upon raw meal, and for fattening animals, swine particularly, we consider three of cooked equal to four bushels of raw meal.

Until within the last three or four years, our society fattened annually for thirty years from forty to fifty thousand pounds of pork, exclusive of lard and offal fat; and it has been the constant practice to cook the meal, for which purpose six or seven large potash kettles are used.

Hay.—We can only speak of this crop from general observation, and would say that our first quality hay is an admixture of one-fourth clover and three-fourths timothy; yield per acre from one to four tons, according to soils and seasons. Cut at the shedding of the blossom, wilt one day in

good sun, then cocked and allowed to stand until done heating—then sunned an hour or two and housed. Thus cured it is invariably bright, sweet and fine, and the labor is less than in the common tedding method.

The practice of irrigating meadows is rapidly giving place to draining and ploughing, though in the opinion of many good judges irrigation under favorable circumstance is of advantage.

Peas are confined to the garden.

Root Crops.—Turnips are only raised for the table. Rutabagas and French turnips have been extensively grown for stock, but now we grow carrots and sugar-beets. Of these latter, we have frequently gathered from seven to fourteen hundred bushels per acre; and we esteem them highly for milch cows, to which they are almost exclusively fed. Carrots are growing in favor among the farmers of our State and with the society, and our community vends perhaps more *bushels* of carrot seed per annum now than it did *pounds* ten or twelve years ago.

They are exceedingly wholesome, and fully equal if not superior to potatoes. Irish potatoes are still very much affected with the rot, and our crop has been reduced to a fourth of what it was formerly; and notwithstanding multitudes of experiments, no preventive to be relied on has yet been discovered.

Butter.—One of our dairies with forty cows has produced the past year six thousand one hundred and eight-five pounds of butter, three thousand seven hundred and forty eight pounds of cheese, and many hogsheads of milk used in its natural state. This is an average of one hundred and fifty-four and a half pounds of butter, and ninety-three and a half pounds of cheese per cow per annum. The other dairies though not producing so much will come near it.

These cows are fed with shorts or chip-stuff, together with roots, and slops from the kitchen, twice each day, say four quarts each of the former and a pailfull of the latter. Some of the cows are soiled, others run to pasture; but soiling is preferable most of the season.

Spring-houses are preferred to cellars for setting milk: ice is much used.

Sheep.—We raise no great quantities of wool for sale. The prevailing races among us are Leicester, Bakewell, Saxon, Merino, and a mixture of all.

Hogs.—The average weight of our hogs for the last twenty-five or thirty years, and fed in the manner heretofore stated, on boiled Indian meal, has ranged from four to five hundred pounds and upwards, at eighteen months old. From experiments made some years since, one bushel of corn at fifty cents, together with kitchen slops per head to a large herd of swine, produced an average of over twenty pounds of pork exclusive of lard. Our estimates of cost have not been sufficiently accurate to be given to the public, but the general conclusion is that, with prudence and economy, pork raising is profitable in our vicinity; but without these there must be loss.

Rain, in each month during the year 1849:—

	SNOW.	RAIN.		RAIN.		SNOW.	RAIN.
January,		$\frac{3}{8}$ in.	May,	$2\frac{3}{4}$ in.	Sept.		$\frac{1}{2}$ in.
February,	14 in.		June,	$2\frac{3}{8}$ "	Oct.		7 "
March,	3 "	3 "	July,	$1\frac{1}{4}$ "	Nov.		$3\frac{5}{8}$ "
April,		$1\frac{1}{4}$ "	August,	$6\frac{5}{8}$ "	Dec.	13 in.	

Snow 30 inches. Rain $28\frac{3}{4}$ inches during the year.

Lime is little used as a manure in our vicinity, ours being a limestone soil, and generally sufficiently impregnated with lime. Reclaimed swamps abounding in vegetable matter are evidently benefited by a dressing of one hundred bushels of lime per acre.

Old orchards, nearly superannuated, have been much improved among us within a few years past by heading in and grafting, together with scraping. Shallow ploughings given annually, liquid manure, chip-dirt, road scrapings, sawdust, &c., have been turned in with marked advantage. Some young orchards have been recently set, which are doing well from the land being constantly under tillage. Various theories have been suggested by nurserymen and orchardists for protecting young trees from the ravages of rabbits, mice, &c. Gas tar has been recommended; but to our sorrow, we found it to be a positive injury—to such an extent, indeed, as to cause the death of many fine trees in a beautiful young orchard of ten years from the bud.

Doubtless there are various qualities of this tar, but that which we were recommended to use seared the bark to the wood, increased the action of the sun's rays to almost a burning point, and stopped up the pores of the bark, which need as much to be open to atmospheric influence as those of the skin of an animal.

All coatings on the limbs or trunks of trees, which entirely exclude the action of the air and moisture, are certain death. Should any doubt this statement, let them take a cloth dipped in common grafting cement, say ten inches in width, and wrap it perfectly tight around the trunk of a young apple-tree, two inches in diameter, near the surface of the ground, and partially cover it with earth, and we will guarantee the tree to die.

Setting of apple or pear-trees should be done early in autumn after the fall of the leaf on the first growth; if some leaves on the second growth are green, it is all the better. *Mulching*, that is, spreading a few inches of litter over the roots after the tree is set, is of incalculable advantage; and we have thus transplanted orchards, which grew as well the season after a fall transplanting as before.

Other matters in your circular we are not able to make any satisfactory returns to, and fear that the above is of little value, because not sufficiently explicit.

Statistical information on the points mentioned in your circular is by far too much overlooked, and I regret my present duties are such as to prevent my obtaining all the information on these subjects which would be agreeable to the Commissioner, to the public, and to the undersigned, a well-wisher to all public and private enterprises truly valuable to mankind.

With due regard, I remain your friend,

In the common cause of Universal Improvement,

GILES B. AVERY.

To the Hon. Thos. Ewbank,
Com'r. of Patents.

Penn Yan, Yates Co., N.Y., *January* 1*st*, 1850.

Dear Sir:—I herewith transmit you, agreeably to solicitation, a few statistics together with some other matters relating to agriculture, as called for in your circular of July last. And permit me to state that it will be impossible to confine myself strictly to the requirements of said circular, and I shall therefore beg leave to make mention only of such facts as

have come to my knowledge, together with such suggestions as shall seem to me best calculated to assist in carrying out the many and very worthy objects you have in contemplation. Residing as I do, in one of the interior, and perhaps the smallest county of western New York, my field of observation has been from necessity somewhat limited, and the few suggestions I offer will be drawn from facts and ideas somewhat local.

The agricultural condition of western New York is gradually on the advance, taking it as a district. Some counties far outstrip others in many and important respects. The causes are more or less owing to the bringing of more land from year to year under cultivation, but perhaps the greatest are *deeper ploughing*, and more thorough tillage consequent upon a more general use of the many valuable improved farm implements, together with a wider spread of agricultural intelligence and scientific knowledge, and the application of the same to the soil. Farmers are becoming gradually more particular in their farm management; they begin to see in some degree the good effects of under-draining; they are more saving of manures, and there is a greater willingness on the part of all to test the virtues of the drill, the cultivator, and the many labor-saving implements so valuable in the putting in and after culture of their various crops.

This is strictly a grain-growing district, and, as exhibited in the following table giving the principal products of our county (Yates), it will be seen is from year to year rapidly on the increase. I have compared the products as returned this year with those as shown by the last State and also those of the last National Census.

	1840.	1845.	1849.
Total wheat crop	352,000	403,069	627,402
" Barley "	31,000	71,000	167,348
" Oats "	161,000	224,673	268,046
" Corn "	104,000	136,000	239,200
" Number of Sheep	86,000	130,000	125,605

The wheat crop of the past season has been universally good, with the exception of a few counties where the weevil has been more or less destructive; there was much to favor and nothing to retard its growth or prevent its ultimate perfection—it stood the winter remarkably well; no rust or other malady befell it, and the summer drouth had the effect only to hasten the time of harvest, which occurred from a week to ten days earlier than usual.

The summer crops were more or less injured by the drouth.

The kinds of wheat heretofore most highly approved were "red-chaff," "crate" and "Hutchinson," but they have in a great degree given place to the more certain, bountiful, and least liable to destruction, the "white flint," and "Soules." I perhaps should except the ravages of the weevil, which in some instances were confined almost wholly to the flint wheat, while other varieties growing side by side escaped uninjured. The crop this year in western New York will not fall below fifteen bushels per acre; that of Yates county has been ascertained to be about eighteen bushels. Spring wheat is considered a poor crop; it is a heavy exhauster, and unless the season is remarkably propitious, a failure is almost certain. The price wheat has commanded in our markets has ranged for the last crop from one dollar to one dollar twelve and a half cents per bushel.

Barley.—Western New York is perhaps as justly celebrated for its barley

as its wheat. The crop has not been as heavy as usual, owing to the severe summer drouth; it will be seen, however, that it is greatly on the increase, while in most of the barley-growing counties, particularly in the eastern part of the State, it is gradually on the decrease, both in quantity and quality. It is considered the best, if not the most profitable spring crop cultivated. It leaves the ground generally in a loose, moist and permeable state, free from weeds, and is generally followed by winter wheat. The soil best adapted is a deep sandy loam, and it is not considered so great an exhauster of the soil as either oats, flax, or spring wheat. The price in market for the present crop has ranged from forty-five to fifty cents per bushel.

The corn crop is never large, and is principally raised for home consumption. In the fattening of pork and beef it is consumed to a very great extent, being crushed or ground, "cob and all," the cob affording or giving a greater bulk, besides adding some considerable nourishment. The average per acre is from forty to fifty bushels. The kind mostly produced is the "eight-rowed yellow;" but whenever the "long white flint" has been thoroughly tested, it has met with decided approval, as there are generally more sound ears upon a hill, and they are at least a third longer. Farmers are opposed to it purely upon the ground of its color, as they suppose it cannot, from that fact, contain as much fattening properties as the yellow. Market price fifty cents per bushel.

Oats are generally considered too great an exhauster to be cultivated to any considerable extent, other than for home consumption. The "long white" is most commonly produced in this section; it scarcely ever yields more than an average of thirty-five to forty bushels per acre, and it is quite an uncommon occurrence for it to hold out weight (the standard being thirty-two pounds to the bushel).

I am quite confident, however, that I have succeeded in the cultivation of a kind raised by me, and known as the "Imperial Oats." A few seeds were received by me from the Patent Office in the winter of 1846, from which I have annually harvested a crop to my perfect satisfaction, and have of the present crop about one hundred bushels for seed and distribution among my friends and neighbors. The berry is short, remarkably plump, and white; the yield per acre is good, the straw not large, never having been known to lodge unless blown down by storms; but their chief merit is in their weight, which is never less than forty pounds to the bushel, and as far as I have been able to test them, they are not disposed to deteriorate in any respect.

The past season, I tested them with the common kind, and received the following results:—

"Imperial oats," 1 acre, 51 bushels, weighing 40 pounds; or at 32 pounds to the bushel, 63 bus. 24 lbs.

"Common oats," 1 acre, 40 bushels, weighing 31 pounds; or at 32 pounds to the bushel, 38 bus. 24 lbs.

The result showing decidedly in favor of the "Imperial," having a two-fold advantage, first a difference of eleven bushels by measure, and secondly a difference of fourteen pounds by weight, making twenty-five bushels per acre in favor of the "Imperial oats."

Rye is not grown to much extent, if at all; the soil is not adapted to it. It is not, and cannot be made, a profitable crop unless upon *light soils*, and that is what we, as a district, are not particularly blessed with.

The *Potato crop* this year is moderate, chiefly owing to the unusually small

number of acres under cultivation; farmers having been nearly discouraged in the cultivation of the same, from the fact of its almost certain destruction or failure by the rot, from year to year; but through the interposition of a kind Providence it has, at least for the present crop, been averted, as not the first instance of the malady has come to my knowledge. The average per acre is from eighty to one hundred bushels.

The amount of seed used in planting, in order to produce the greatest yield, has been to me for some time a matter of doubt; some farmers contending that ten bushels per acre is none too small, others fifteen, and some even go so high as twenty bushels. But from a series of experiments for several years past, I am convinced that in this small county there is annually a waste or throwing away in seed of no less than ten thousand bushels. In the year 1847, an experiment was made by me, which has on each returning spring been repeated, and proved to my perfect satisfaction. It was as follows:—I took about three-fourths of an acre of deep sandy loam, well manured, and every portion equally well ploughed and thoroughly cultivated, and on the 2d of May, planted the same in rows and hills, north and south, three feet by two, in the following manner:—

Two rows with long pink eyes,	2 whole potatoes	in each hill.	
" " "	1	"	"
" " "	2 seed ends		"
" large flesh-colored,	3 potatoes		"
" " "	1	"	"
" " "	2 seed ends		"

The after culture being the same, on harvesting the crop, to my astonishment, I could not discover the slightest difference in any respect, either as to quantity or quality.

It will be seen then when the "seed end" merely answered for seed, that at least two-thirds of this valuable esculent is saved; and I may safely say that four bushels of seed will, under ordinary circumstances, be sufficient to plant one acre of ground; and the product will be equal in amount to that produced from twenty bushels of seed, when the whole, or any number of potatoes to each hill, are planted. The ordinary price in this market is from twenty-five to fifty cents.

The crop of *hay* the past season was good, the kinds usually cultivated being clover and timothy. The clover is preferred for consumption upon the farm, while the timothy takes the preference in our city and village markets. Clover is usually cultivated upon the high rolling lands, the timothy is confined mostly to low lands. The average per acre is from one and a half to two tons. Market price in cities and villages from eight to ten dollars; in the country from five to seven dollars.

The cultivation of good fruit, until within a very few years past, has been, to farmers in particular, a matter of secondary importance: a few, however, I am happy to say, are beginning to open their eyes and their *mouths* to the subject, and through the medium of both, it is to be hoped that sufficient interest and activity will be aroused to bring about an improvement so long and ardently wished.

This perhaps is the best fruit-growing district of the State; but the past year has been almost an entire failure, the spring frosts effectually destroying early fruit of every description—a few favorable locations only being spared. Farmers are beginning to trim up and graft their old orchards; others are setting anew the earliest and best varieties; and on each returning spring

and fall is brought to his door the nurseryman's wagon, laden with the choicest and best varieties of fruit trees, shrubs, and plants; so that no man, who, in this day of progress, is the happy possessor of a rod square of his mother earth, can offer a good and sufficient reason why he or his children should be deprived the privilege or the pleasure, at some future day, of "sitting beneath his own vines and fig-trees," and eating in peace fruits purchased by his own labors and good sense.

From the fact of this being a grain-growing district with but the exception of a few counties, the dairy is a secondary branch of farm management. The average number of pounds of butter per cow in milk is not far from one hundred, commanding in our city and village markets from twelve to fifteen cents per pound. The county of Alleghany, I believe, has the credit of manufacturing the best and perhaps the greatest amount of cheese.*

With few exceptions, there is a manifest inactivity and want of pride in regard to the improvement and introduction of improved breeds of stock of all kinds. In the county of Yates, I am not aware that there is the first full-blood breeding animal of any description, unless it be the full blood *land-shark hog*. The native stock however is as good as native breeds in general. Many very valuable droves of half and quarter-blood Durhams, and Devons are picked up by drovers in the counties of Genesee, Livingston, Chautauque, and Cattaraugus; but the great amount of cattle are native, some of which are very good.

Labor-saving implements are beginning to be used pretty generally. Some of those most highly approved are Hussey's Reaper; Benton's, Hall's and Ewings' Horse-Power; Hathaway's, Hall's, and Ewing's Threshing Machines; Ketchum's Mowing Machine, and Sherman's and Palmer's Wheat Drills.

There are a great variety of ploughs in use in this section, and each one has its advocates, and each in its turn is pronounced by its admirers to be the best. In order to test the relative merits of these in this immediate section, a plough trial was made under the direction of the Seneca County Agricultural Society, in August last, with the following results:—

		lbs.
Burrell's Ontario Co. Small-wheel Plough	(by stationary power),	345
" " " " No. 2	"	356
" " " " " 5	"	295
" " " " " 6	"	290
" " Land-side Plough, No. 2	"	427
" " " " " 4	"	485
Yates Co. "Penn Yan Plough,"	"	355
" "Dundee Plough,"	"	441
Ontario Co. "Buckeye" or "Iron-beam Plough,"	"	372
"Seneca Co. Plough,"	"	415
"Crain Plough,"	"	493

Agreeably to a suggestion in your circular, I herewith transmit you an abstract from a Meteorological Register kept by Dr. H. P. Sartwell, of this place, giving the mean temperature, and also the amount of rain for each month of the year; and I am told by this close-observing and truly scientific gentleman, that the amount of rain the past year is much smaller than usual, and that the quantity for the last twenty years has not been over twenty-eight inches per year.

* The writer is in error in supposing Alleghany produces the most cheese. That honor belongs to Herkimer.

	Mean Tem.	Amount of Rain. Inches.
January . .	22°.12	.57
February . .	21°.14	.54
March . .	33°.64	.85
April . .	40°.96	.48
May . .	52°.22	3.12
June . .	64°.63	2.20
July . .	66°.77	1.60
August . .	67°.22	1.69
September . .	58°.60	1.37
October . .	46°.32	6.29
November . .	44°.66	2.88
December . .	27°.25	1.38
Mean for one year	45°.46	Total rain 22.97

It will be seen from the above table, that in the one month of October there fell nearly as much rain as in the *seven* months of Dec., Jan., Feb., March, April, July and September.

I have thus carefully enumerated the several branches embraced in your circular as applicable to this section of the Empire State, in as concise and lucid a manner as the subject would admit; and I trust with that candor and fairness so requisite in a matter of this character. It is hoped that it will meet your approbation, and aid in some small degree in the promotion of agriculture. I remain yours, respectfully, &c.,

CHARLES LEE.

Hon. THOS. EWBANK, *Com. of Patents.*

N. B.—I take the liberty to append to my report the agricultural statistics of one county in Western New York for the past year, and which I may venture to say is a pretty fair criterion in relation to many others.

Report of the Agricultural Condition of Yates County for 1849.

ESTIMATED PRODUCTS.

	Acres cultivated.	Quantity of seed per acre.	Quantity raised per acre.	Cost of cultivation per acre.	Time of sowing or planting.	Kinds produced
Wheat	33,818	1¾	18¼	$8 75	Sept. 1st to 20th	Flint and Soule's
Barley	8,172	2	20¾	4 50	April 15th to May	Six rowed
Oats	8,945	2½	29¾	4 00	May 10th	Long white
Rye						None returned
Buckwheat						
Indian corn	7,640	6 to 8 qts.	28½	8 38	May 10th to 20th	Eight-rowed yellow
Flax						None returned
Hay	14,538		1¾ tons	1 25		Clover and timothy
Potatoes	1,419	11½	80	7 00	May 20th	Flesh-col. and pink eye
Root crops						None returned
Pod fruits						"
Grass seeds						"
Dried fruits						"
Pears						"
Apples						"
Maple sugar						"

ESTIMATED PRODUCTS.

	No. of lbs.	No. cows in milk.	No. of fowls.	No. of eggs.	Hives of bees.	Pounds of honey.
Butter	763,850	7,900	86,000	63,000 doz.	None returned.	26,940
Cheese	None returned.				"	
Poultry					"	
Eggs	"				"	
Bees	"					

LIVE STOCK.

	Number.	Breed.	Average weight of fleeces.	
Bulls	229	Native.		Present population 22,000
Cows	8,061			Total number of cows 210,000
Steers	2,206			Real and personal estate 4,400,000
Oxen	990			County tax $21,000
Heifers	1,760			
Calves				
Bucks	125,605	Saxon, Merino, and Native.	3lb.	
Ewes				
Lambs				
Horses	6,958	Native.		
Swine	18,805			

The kind of manure used—barn-yard and gypsum.

WAGES.

Per month.	Per year.	Per day.	Per week.
$10 to 14.	$150.	75 to $1 25	$1 Female.

ORLEANS, JEFFERSON CO., NEW YORK, *December* 15*th*, 1849.

SIR:—Before answering the questions proposed in your circular, I will observe, that I must confine myself in my replies to this region, and that in the estimates which I have made of the cost of raising, yield per acre, or average weight of the several crops, I have not taken into account any extra labor bestowed upon the land, such as rolling after covering the seed with the harrow, draining, &c.; as these expenses soon pay for themselves by the increased yield per acre.

All spring grains, when sown from the 15th April to 10th of May, usually give the largest and heaviest crops. Corn should be planted from the 10th to the 20th May; and Black Sea spring wheat does best if sown about the same time. The singular weather during the past season in this neighborhood prevents my giving favorable details as to the amount of grain raised in this county. Never since the settlement of this section of the country, have the farmers been so poorly repaid for their labors. The spring opened late and wet, ploughing was delayed, and most crops were put in later than usual. From June until October, they suffered from severe drouths, the occasional light showers at long intervals, doing little or no good to vege-

tation. The consequence was that the crops of rye, corn, spring wheat, peas, and barley cannot be estimated at much more than half an average crop in this county. Potatoes remained healthy; on account of the disease in former years, a less quantity was planted, and there not being moisture enough above or below ground to aid fermentation or corruption, they escaped the rot; but the product of this county cannot be more than one-half the usual quantity raised.

Our county has a very flourishing Agricultural Society, and, I believe, one of the oldest in the State. It awards, yearly, premiums to the amount of five hundred dollars. The 44° of latitude passes nearly through the centre of Jefferson County; and the Black River, which runs westerly along that parallel, with a fall of four hundred and eighty feet at various points from Carthage to Dexter, about twenty-four miles, constitutes the immense and central water-power of the county; which at no remote day, will establish a continuous line of factories and villages along that river. Washed on the north and west by the St. Lawrence and Lake Ontario, Jefferson County covers an area of seven hundred and twenty thousand, five hundred and seventy-four acres of land, now divided into twenty-two towns, nine of which are south of the Black River, and the remainder north of it.

The face of the country south of this river is rolling, beautifully diversified by hills and dales; in some parts somewhat broken by gulfs, and in others stretching out in rich and level fields.

The land is generally well watered by durable springs, and the soil is of a loose, gravelly or loamy texture, well adapted to spring crops. These towns produce large quantities of butter and cheese of good quality, and in some places winter wheat.

The northern towns, lying on a limestone sub-strata, are mostly level, or gradually rising in table lands, not so well watered by lasting springs during the dry season. They are, however, annually increasing the dairy business; supplying by art and labor the running water which is denied by nature. They already produce butter and cheese equal in quality to those made in any other part of the country. Some years ago, before the weevil or wheat-midge made its appearance, these northern towns produced large crops of winter wheat. In 1840, the crop of winter wheat in this county amounted to four hundred and six thousand, seven hundred and twenty-one bushels—since that time the produce has gradually diminished, and the culture of it is now nearly abandoned. In 1842, our wheat fields were somewhat injured by the Hessian fly; but I have never heard of this insect doing much damage in this county. The next year, the wheat-midge first reached our neighborhood, and has annually increased its ravages until 1848, since which time it appears to have decreased, owing, doubtless, to the decrease of wheat fields. Before the appearance of the midge, we usually sowed "Red-chaffbald" wheat, which yielded well, and was quite a favorite. But such were the ravages of the fly that we were compelled to give up this variety, and have recourse to the "Mediterranean," "Canada flint," and other new and early kinds, which are still grown to a small extent, but are not entirely proof against the midge.

Of spring wheats, the "Red-chaff bearded," or "Black Sea," had been extensively introduced, and is now raised with good success. It is sown about five pecks to the acre, and weighs from sixty to sixty-four pounds to the bushel, and has never been affected by rust. It yields well, and makes

good flour. The following statement of the cost of cultivation per acre is about the average of this county:—

Spring Wheat.

Dr.		Cr.	
To Interest on $20—1 acre—1 year,	$1 40	By 15 bushels wheat, at 87½ cents per bushel,	$13 13
" Ploughing,	1 00		
" Dragging,	30		
" Seed and Sowing 1¼ bushels,	1 38	Deduct cost of raising,	5 63
" Dragging in,	30		———
" Harvesting, &c.	1 25	Profit,	$7 50
(Straw pays for threshing.)	———		
	$5 63	Cost per bushel about 38 cents.	

Oats.—This grain has always been an important crop in this county. Average yield, thirty to forty bushels per acre, and weighing from thirty to thirty-seven pounds to the bushel. The standard weight is thirty-two pounds. Among the best varieties that I have tried are the "Yellow mane oats," which for yield and weight of grain are unsurpassed. In this county, fully as much and perhaps more land is devoted to the culture of this crop now than was in years past. As feed, compared with corn, it is generally believed that two bushels of oats are equal to sixty-eight pounds of corn and cob meal ground together; and when oats are scarce and high, corn is often substituted as feed for horses, in the above proportion.—The following is my estimate of the cost of cultivation:—

Oats.

Dr.		Cr.	
Interest on $20—1 year,	$1 40	By 35 bushels per acre at 25 cts. per bushel,	$8 75
Ploughing, 1 acre,	1 00		
Dragging the same,	30		
3 bushels seed, 25c, sowing 12½c.	88	Deduct cost of raising,	4 88
Dragging in,	30		———
Harvest and drawing,	1 00	Profit,	$3 87
(Straw pays for threshing.)	———		
	$4 88	Cost per bushel about 14 cents.	

Rye.—This has become a favorite crop in this county since the midge has rendered the cultivation of wheat so uncertain. The yield per acre ranges from fifteen to twenty-five bushels. It is usually sown after peas or barley, from 1st September to 15th October, at the rate of one and a half bushels per acre. It is to a certain extent used for bread, among the German settlers here, but the greater part is sold for distilling.

Rye.

Dr.		Cr.	
Interest on $20—1 year,	$1 40	By 20 bushels per acre at 50 cents per bushel,	$10 00
Ploughing 1 acre,	1 00		
Dragging, do.	30	Deduct cost of raising,	5 13
Seed, 1½ bushels, and sowing,	88		———
Harvesting,	1 25	Profit,	4 87
(Straw pays for threshing.)	———		
	$5 13	Cost per bushel about 25 cts.	

Corn.—The varieties most esteemed in this vicinity are the "yellow eight-rowed," and the "white eight-rowed." The ears of these kinds are about eleven to twelve inches long, the cobs small, and the kernels large and heavy. The latter variety, though earlier to ripen, is not as extensively raised as the yellow, because it does not sell as well in market. It makes, however, a beautiful white and sweet meal, which, when mixed with one-third wheat flour, forms a very palatable bread. Both the above varieties are

preferred because they ripen earlier than any other kinds, and the cob dries quicker. They are very prolific, having usually two or three ears on each stalk, if grown on well-prepared land, and from seed well selected. Too great care cannot be taken in selecting and preserving the seed. I consider this the most profitable crop raised on a farm; but corn likes *fair play*, and, as the common saying is, "if you cheat it, depend upon it, it will cheat you." The common yield is from twenty-five to forty bushels per acre. The fodder or stalks, when well cured, are as good as hay, weight for weight. Cows will give more and better milk when fed on them; but cattle will usually stand severe cold better on hay. As to feeding grain, I think that if cooked it will do as well whole as ground, excepting perhaps barley, which I prefer to have crushed or ground. Cooking adds nearly one-half the value of raw grain.

Corn.

Dr.		Cr.	
Interest on $20—1 year . .	$1 40	By 30 bushels per acre, at 50 cents	
Ploughing 1 acre, ...	1 00	per bushel, ...	$15 00
Dragging, do.	30		
Planting and seed, ...	75	Fodder per acre, ...	2 00
Hoeing twice, ...	2 00		———
Harrowing and cutting fodder, .	50		17 00
Husking and threshing, . .	2 00	Deduct cost of raising, . . .	7 95
	———		———
	$7 95	Profit, ...	9 05

Peas.—This crop stands next to corn as food for hogs. It is also an improver of the soil, and leaves the ground light and mellow, so that with one ploughing wheat and rye do well after peas. The most esteemed varieties are the "marrowfat," the "branch pea," and the "golden-vine pea." The haulm or vines are not much relished as fodder, except by sheep and young horses, and they merely pick off the empty pods and leave most of the vines. The average product per acre is from twenty-five to thirty-five bushels, and the price from forty to fifty cents per bushel.

Butter and Cheese.—The dairy business has been increasing in this county since 1840, and butter and cheese are the most profitable and reliable products of the farm. The average annual produce per cow is from one hundred and twenty-five to one hundred and fifty pounds of butter, and from three to four hundred pounds of cheese. With twenty-six cows, mostly of native breed, there was made on my farm, during the past year, from the first of April to twelfth December, thirty-eight hundred pounds of butter, which was sold on the farm at fifteen cents per pound. I could have a spring-house, or a lasting spring of water brought through the cellar; but from experience, we prefer a cool, dry and clean cellar. It produces the sweetest cream and the best butter.

Horned Cattle.—This county raises much fine young stock. Average price at three years old, fifteen dollars; cost of keeping, at least five dollars per year; this is not remunerating; and the consequence is that more heifers are now raised than steers. Heifers at two and three years old begin to pay for their keeping, and when they prove inferior cows, are turned off in the fall at ten or twelve dollars, according to size and age, and driven to Albany, Boston, or New York markets.

Sheep.—The low price of wool and the profits of dairy husbandry have done away with most of our sheep farms, where practicable, and the number of sheep in this county must have fallen off very much since the last

census in 1845. The average weight of fleece is from three to four pounds, native and mixed breeds. Our wool is sold in the county to be sent to eastern markets, except what is worked up in families or factories among us. Average price from twenty to thirty cents per pound, according to quality. The cost of keeping sheep per head cannot be much less than seventy-five cents or one dollar per year.

Labor.—The usual price of hired hands on farms is from ten to fifteen dollars per month, with board, which is worth one dollar twenty-five per week. In haying, we pay from seventy-five cents to one dollar per day; and in harvest for cradling, one dollar or one and a half per day, with board.

In conclusion, I would say that Jefferson county bids fair to stand foremost among the most productive and the richest counties in the State. We have one hundred and forty miles of plank roads either built or in the process of building, running in every direction through the county. These have been built entirely by the enterprise of our own citizens; and when we add to these another great improvement in communication, which is now in a fair way to be soon completed, the "Rome and St. Vincent railroad," the stock of which was principally subscribed for by the farmers and wealthy citizens of this county, can it be denied that Jefferson county should have the best market in the State. To crown these efforts of enterprise, a better spirit is coming over the farmers of our section; they all seem eager for improvement, and are vying with each other who shall do most to promote the great interests of agriculture and contribute to the welfare of the country. They begin to see that something can be learned from books as well as from practice. The agricultural papers circulating all over the land are doing much to bring about this change, and to persuade farmers that the old system of skinning the land should be abandoned, as degrading and destructive to their own best interests.

The inventive genius of mechanics, by improving the various implements of husbandry, has done much for the tillers of the soil. Their newly invented horse-powers, their threshers and separators, their seed-sowers and grain-crushers, and other valuable machines, do much to expedite the labors of the farm; and the time is fast approaching when the husbandman will have more leisure for mental cultivation, and the science of farming will be much better understood than it now is. The products of the land, instead of being lessened under an improved system of tillage, will constantly be increased, and the tiller of the soil, fully satisfied with his vocation, will bless Providence that made him a farmer.

Respectfully your obedient servant,

JOHN N. ROTTIERS.

Hon. Thomas Ewbank,

Commissioner of Patents.

Newton, Sussex Co., N. J., *January*, 1850.

Sir:—I am sorry to say that none of the inquiries contained in the circular of the Patent Office, soliciting agricultural statistics, can be answered with an exactness which would make them valuable. The nearest I could approach would be an opinion, and that must be based upon the statements of farmers from different sections. The estimates made by them of their crops is not by actual measurement, but by crude guessing. Therefore certain and reliable facts cannot be given.

Pork and butter are the principal products of this county, and are sold in the New York city market. Formerly grain was the main staple, but for a number of years the former business has been steadily increasing, and now has the ascendency. At this time there is not sufficient wheat grown for home consumption; while in former years there was always a surplus. One reason for abandoning the wheat crop, is the exhausted state of the soils, which will no longer remunerate the farmer for his time and labor, when applied to that particular branch.

No effort is made to restore the land to its original fertility, because none take the trouble to ascertain the causes and apply the remedy. The pork is mostly made from the refuse milk of the dairies, and corn; but the corn is not generally used until the feeding on milk has ceased. Hence the corn crop is an important one, and much attention is given to its culture. The crop of 1849 is greater than any ever before raised in this county. The increase is not in the number of acres planted, but in the produce per acre; and is to be attributed entirely to the favorable season. From some experiments made during the fall, I am strongly inclined to give the preference to the eight-rowed yellow variety, and shall be particular another season not to plant any other kind. Many observing farmers have given their opinion in favor of this variety, but without any data upon which to base the preference.

In intrinsic value for feeding, I think there is a difference of twenty-five per cent. in favor of the yellow corn.

The *potato* crop is not as large as in past years, in consequence of the disease having deterred farmers from planting their usual quantity. The disease in the last crop assumed a different form, and is less destructive. It is now called the "dry rot," and does not produce the rapid decay and fetid smell characterizing the disease in its original form.

In 1848, I planted potatoes on a clay loam, and in each hill I put one gill of air-slaked lime. Did not use any other manure, except once I put on some gypsum; otherwise the cultivation was that usually given to such crops. Suspecting from the observations of former years that the fall rains had much to do with the disease, I concluded to gather the crop early, which I did the last of August and first of September. The skin at that time was quite loose, and was much broken by handling. I housed them where there was a good circulation of air, and did not disturb them until they were stored in the cellar for winter. There was no appearance of rot among them, and they kept well until July, 1849. May 11th, 1849, I planted potatoes on corn stubble, and used no manure or lime. May 23d, planted again in another part of the same field. June 8th, planted another lot on grass sod, without manure. All had the usual mode of cultivation. In August I commenced digging those planted first, and no disease was then discovered, and they still remain healthy. The later planting was left until the last of September, and a part were secured before the fall rains began. These were free from rot, and have continued so. Those which were in the ground during the rains showed marks of disease when dug, and the supposed sound ones were carefully separated, and kept by themselves in a cool and airy shed, and left undisturbed for some weeks, when they were examined, and perhaps one-third were found to be affected with the dry rot. These were picked out, and the selected good ones were sprinkled with lime, and put away in the cellar. Subsequent examination showed but little further progress in the disease, and some potatoes were found thoroughly diseased

at one end, and perfectly sound at the other. The only way to account for this is the use of the lime. The effect seemed to be to check the disease even after it had made some progress. I have been informed of instances where the effect was similar, but the lime was sprinkled on the potatoes when they were first taken from the field.

It will be observed that in the instances when the potatoes were dug before the rains, they escaped the disease; and I am satisfied that early planting and gathering are as sure preventives as are yet known, and that gravelly knolls have the preference over any other situations.

The system of farming here is the same as that generally pursued throughout the whole country, and what is known as the *old system.* No improvements of modern times have been introduced, except in a few isolated cases. But a spirit of inquiry has been aroused, and in almost every neighborhood some enterprising individual is eagerly seeking knowledge and information as to the improved methods of farming.

Through the persuasions of the editor of "The Working Farmer," I was induced to try the effect of subsoiling my corn ground, and the results have been beyond my highest expectations. In short, the crop was double any other which had been gathered from the same land. I cannot do otherwise than speak most encouragingly of the use of the sub-soil plough, and my wish is that one was in the hands of every farmer in the country. So much has been written on the subject, that the philosophy of its operations, and the many advantages to be derived from its use, need not here be repeated.

Very respectfully yours, &c.,

CHARLES M. HALSTED.

New Castle Co., Delaware, *February 4th*, 1850.

Sir:—In reply to the questions of your circular, I present the following:

Wheat.—Two varieties are sown in this county; the "Mediterranean" and the "Stewart white;" the old "red beard" is sown but little. The Mediterranean is more generally sown than the white, and is perhaps five to eight days earlier. Weight sixty pounds.

The fly attacks both varieties, and last year's crop was probably one-fourth short on that account.

The early-sowed was, in this vicinity, very much injured, while that sown after the drouth (middle of September) suffered but little. Some good crops were made, but they were exceptions. The rust attacks the white wheat—the Mediterranean is free from it. Time of sowing, from September 1st to 25th. Quantity of seed from one and a quarter to two bushels per acre; harvested from June 18th to July 5th. Price, one dollar and five cents for red, and one dollar and ten cents for white.

Wheat follows oats, or is sown on clover sod; each has its advocates, and some farmers try both. Others again, sow in the corn, substituting wheat for oats. The soil best adapted to its culture is one of medium clayness. Our soil in Delaware varies from the stiffest clay to the light drifting sand. Wheat is found in perfection about the middle of New Castle county, although fine crops are raised from the northern line, among the hilly hundreds, throughout New Castle and a part of Kent. The yield varies from eight to forty bushels per acre—a wide range. On *unimproved* worn-out lands (and these are becoming rarer every year, under the influence which an enlightened agriculture exerts), the yield is about the seed, or but little

more. The first lift from the helping hand of lime or marl will give six to ten bushels; and once on its feet, the long abused soil rapidly advance in strength until it will give, in the regular rotation, 25, 30, 35, 40, and even 45 bushels per acre. The average yield of improved lands in New Castle is about 20 bushels, and a much higher rate is easily attained. The aggregate of the crop I know not, but the census will show this, and the aggregates of other products, which it is impossible for an unofficial man to give, except by estimate, which is always vague—frequently wild. Basing, however, an estimate on the Reports for 1847 and '48, and comparing the crop of 1849, the number of bushels will not vary much from 475,000. Cost of production I estimate as follows:—

Ploughing clover sod,	$1 00
Harrowing,	20
Sowing,	05
Cradling, binding, &c.,	1 00
Threshing,	2 00
Seed, 1½ bushels at $1 10,	1 65
Hauling,	40
Interest on $80, 6 per cent.,	4 80
	$11 10
Deduct 1 ton straw,	3 00
	8 10
Cost per bushel,	40½
On stubble we may add one-fifth of 20 loads manure at 50 cents per load,	2 00
Cost of 20 bushels,	$10 10
Cost per bushel,	50½

Oats.—One variety is universally used—the common oat. I have tried the imported "Irish," but it degenerated the first season, and presents no advantage that I know over the common kind. The "black," and the "barley" oats are sown by some few. The Irish ripened about ten days later than the common. I cut it on the 26th of July; the common was cut from the 15th to the 21st. Quantity of seed, from 2 to 3 bushels per acre. It is sown from March 20th to April 8th. Price, 28 to 31 cents. The value of oats as feed for horses is about half that of corn. Its culture is becoming unpopular; it has not paid enough profit, and many are endeavoring to substitute corn or wheat in rotation.

The yield varies with the season, and of course with the quality of the land. For the last two or three years, the crops have been poor, from 20 to 30 bushels per acre; good land, in good seasons, should give 40 to 45 bushels.

Estimate of crop, 740,000 bushels.

Estimate of cost:—

Ploughing, ...	$1 00
Harrowing, ...	20
Seed, 3 bushels, 30 cents, . .	90
Harvesting, ...	1 00
Threshing, ...	1 00
Hauling, ...	50
Interest on land, ...	480
Sowing, ...	05
	9 45
Deduct 1 ton straw, . . .	3 00
	6 45
Estimating crop at 40 bushels per acre, cost per bushel,	$16\frac{1}{8}$
" " 75 " " " "	$25\frac{4}{5}$

Rye.—But little sown; many farmers sow from $\frac{1}{4}$ to $\frac{3}{4}$ of an acre for the straw—principally for home use. Straw will average $10 per ton, or $6 per 100 bundles. The seed does not appear to fill well, but I know of no defect in the soil which would prevent its culture.

Barley.—Little sown. In the lower parts of the county, fine crops have been raised; when the land is in good heart, it will produce forty to fifty bushels.

Corn.—Of this, the most important of our field crops, we have many varieties, and everybody esteems his own kind the best. The grain varies from pure "flint" to pure "gourd-seed"—of course the mixtures which are between these two varieties are most common—it inclines more to gourd-seed than to flint. Flint weighs full standard fifty-six, the gourd-seed from forty-nine to fifty-two pounds, and the mixtures range between. I omitted to mention that the standard weight of wheat is sixty pounds. The standards are fixed by law. Oats are sold by measure. Flint ripens from ten days to two weeks earlier. It will not produce as many pounds per acre as the lighter gourd-seed. Soil exerts its influence over the character of corn, a heavy soil tending to produce flint—light soil, gourd-seed.

The corn is "cut up" in the fall, and after curing in the shuck, is husked; the shuck remaining on the stalk with the blades.

I am unable to estimate its value, but the entire fodder is worth one-fourth as much as good clover hay; meal is better for feeding than whole corn—except, perhaps, for sheep.

The average yield on improved land is fifty bushels; though crops of one hundred and twelve and one hundred and sixty bushels per acre are *reported* to have been raised in the county, in 1849. *I, however, did not see them.* The yield increases from year to year. A general and rapid improvement of the State is in progress, and in nothing is this seen more clearly than in the corn crop. Mossy "old sedge" fields, which have laid out for years, are broken up, and will yield, if it be a good season, from five to ten bushels per acre; fence them, lime them with twenty to thirty bushels, and seed the oat crop with clover, and in two years the clover sod will return eighteen to twenty bushels of corn.—Another dressing of lime, or its equivalent in marl, of which there is an abundance in the lower half of New Castle County, will show thirty bushels corn; and of wheat, if the farm manure be used on it, nine to twelve bushels will not be too much to expect.

Clover and lime will bring up all our "old fields;" these in New Castle County are now a rarity, and the middle section of the State is pursuing the same renovating process with great assiduity and the same success.

I would estimate the aggregate crop of corn at 4,200,000 bushels.

Time of planting, from April 25th to May 10th. Quantity of seed, from 7 to 8 quarts.

The cost of production is as follows:—

Seed	08	Checkering	15
Ploughing	1 00	Planting	19½
Harrowing	20	Working	1 20
Marking	15	Cutting up	37½
Husking	1 12½		
Shelling	50		10 77½
Hauling	1 00	Deduct fodder	1 50
Interest	4 80		
			50)9 27½
		Cost per bushel	18½

Hay.—On upland it is best to sow clover alone, or mixed with timothy, and the yield is about one ton of clover, or one and a half of timothy. Mixed hay is valued as containing the good qualities of both, but from the difference in time of ripening it is difficult to save both in perfection. Timothy is preferred for horses, clover and mixed for stock.

Extensive meadows, or "marshes" as they are termed, are found on the margin of the Delaware river and bay, and their various creeks on the Choptank, and Nanticoke rivers, and numerous branches. This alluvial deposit covers many thousand acres, which are reclaimed from the tide by means of levees of mud, or of mud and stone wall. One or more main drains are made, many lateral ditches and land drains, to carry off the rain and spring water; the marsh is laid down in timothy, and becomes a splendid meadow, from which from one to three tons per acre are cut, heavy cattle are fattened, and where sufficiently high, corn is raised from sixty to ninety bushels per acre.

The marshes of Christiana Creek are worth from one to two hundred dollars per acre. The quantity reclaimed from the water is very large; but immense tracts, facing the middle and lower portions of the State, are yet waste, abiding their time, which at the present rate of progressive improvement is not far distant.

Price of hay for the past year from $11 to $14 per ton.

Potatoes.—The crop of the past year was a very fine one; little or not at all affected by the disease. The Mercer is the favorite for planting; other varieties are "Early White," "Pink Eye," and "Blue Skin." Mercers ranged through the season from 40 cents to $1 12 per bushel. Average yield per acre, one hundred and fifty bushels.

Estimated aggregate crop of potatoes in the State, at one acre to a farmer, and one hundred bushels per acre, 350,000 bushels.

Cost of production.

Seed, 10 bus. @ 75 cents	$7 50
Ploughing	1 00
Planting and spreading manure	3 50
Working	1 75
Digging	3 00
Hauling	3 00
Interest on land	4 80
¼ of 20 loads manure	2 50
Cost of 150 bushels	27 05
Cost per bushel	18 cents.

Sweet potatoes are raised only for home consumption; some turnips, a few carrots and beets are raised for stock—I know not what quantity, but it is quite small. Root cultivation has been neglected.

Butter.—The quantity made is very great. Baltimore, Philadelphia, and Wilmington being the markets. Dairies of from 15 to 100 cows are common through New Castle county. First class cows in dairies yield in the first six months 144 lbs.; in the next three months 36 lbs.=180 lbs. @ 20 cts.=$36.00. Second class cows in the first 6 months 80 lbs.—next three months 20 lbs.=100 lbs. @ 20 cts. $20.00. Four dairies in one family, of Red-Lion Hundred, send 1,000 lbs. per week to Baltimore, from 200 cows, for 6 months.

Butter is worth from 14 to 28 cents; averaging above 20 cents.

Well-ventilated cellars are preferred for butter purposes. Cream for ices finds a large and profitable market in the cities.

Cheese.—Little or none made in the State.

Horses.—Horse-breeding for export not attended to largely. Western horses are brought in and disposed of in the State, while at the same time many fine animals are driven out to the cities.

Stock generally of good quality; and the number keeps pace with the increasing population.

Mules come under the same category; of both horses and mules, more come in than go out; for the increase in the number of farms, and their quality, demand annually a large increase in number of these animals. Mules are preferred, where steady work is required; such as hauling. Their price is from $175 to $225 per pair. Horses (farm) range from $40 to $80; average $50 each.

Horned Cattle.—Large numbers of home-raised and drove cattle are fattened every year for the northern markets. Their value may be stated at an average of $20 for steers, and $40 when fat. Cows, dry, $12 to $20. Beef $5 to $6 50 per cwt. Wilmington and Philadelphia are the markets. The Devons are becoming a favorite stock.

Sheep.—The varieties generally found are crosses of the merino and common country sheep. In the lower part of the State the common breed prevails; in the remainder, half and quarter merino. In this county, the highly improved Leicesters and Oxfordshires are found in perfection; finer specimens, or flocks, are not to be found in the United States.

The Messrs. Reybold have expended much care and a large outlay in introducing the finest specimens, having personally selected them from the English flocks; their sheep weigh, when dressed, from 150 to 180 pounds. January 31st, Mr. J. C. Clark sold a three-year old wether for sixteen

dollars, which weighed over 150 pounds, and in two or three months more would in all probability reach 185 or 190 pounds. The clip of the Leicesters will range from six to seven pounds, value 25 to 30 cents per pound. The half merinos clip about three and a half pounds, at about the same rate. The common coarse wooled about four pounds, at 20 to 25 cents per pound. The wool sold in Philadelphia. The cost of keeping will not be far from $1 50 per head.

Cost of half-blood ewe,	$2 00	Value of fleece,	$1 00
" to keep "	1 50	" lamb,	2 25
		" ewe, fat,	2 75
	$3 50		
Profit per head, $2 50			$6 00

Eight sheep can be kept where one bullock can be fed. The Leicesters and Oxfordshires, of course, require more room and more feed. To fatten these, one bushel of corn per month is sufficient, and two or three will make them fine for slaughtering. Many sheep are killed by dogs, but I cannot ascertain the number.

Hogs.—The ordinary age at killing is from fourteen to sixteen months, and average weight 300 pounds. It is difficult to state the cost of the pork, but perhaps four cents per pound is the lowest figure. Few farmers keep more than they can "slop," and these require about 4 bushels corn per 100 lbs., to fatten them.

Temperature.—The thermometer on the 21st June, 1849, stood at $101\frac{1}{2}°$ in the shade, northwest exposure. January 11th, 2° above zero.

The mean temperature of the year was $51\frac{7}{18}°$, at 8 A.M. $48\frac{1}{6}°$, at 2 P.M. $59\frac{1}{4}°$, at sundown $51\frac{3}{4}°$.

Labor.—With board 50 cents per day, $8 to $12 per month; without board 75 cents per day, $14 to $20 per month. Harvest ranges from $1 to $1 50 per day. Board from $6 50 to $7 50 per month.

Plaster is much used on clover; it is applied at the rate of one bushel per acre, and frequently doubles the crop, always improving it. It is sown also on wheat.

Guano is imported largely. Hundreds of tons are used in corn and wheat. The best method is thought to be to plough in about three hundred pounds per acre. On the best land the benefit from it is not so great comparatively as on thin soils. In the lower sections, good crops, say twenty or thirty bushels corn, are raised with it, when not more than eight or ten could be obtained without it.

Marl is extensively applied in the rural districts. There are two kinds: the "shell," and the "greensand," containing from 20 to 58 per cent. of carbonate of lime, and from 26 to 33 per cent. of the greensand, which latter contains 5 to 10 per cent. of potash. From 250 to 500 bushels are spread either on the clover sod or on the ploughed corn ground. Many old farms have been resuscitated by this fertilizer.

Poudrette is used by some few, who put about three bushels per acre on corn, applying it in the hill. They think it pays them a profit. The value of manure is at a high point in our estimation, and increasing attention is paid to the subject.

Lime.—This is the great fertilizer and improver. It is brought within the reach of every farmer in the State, by means of the canal, railroads and numerous navigable streams. Its cost varies from 13 to 15 cents per bushel on the shore, and from $\frac{1}{2}$ to 2 cents more places it on the farm ready for

slaking and spreading. From 25 to 40 bushels per acre is the ordinary dose, and it is applied generally before the corn crop, once in each rotation—the common rotation being corn, oats, wheat, clover, pasture.

Orchards.—General attention is being turned towards the renewal of the fruit orchards, which had degenerated, and in many places died out as the land was impoverished. The peach orchards form a very important branch of industry and profit. Thousands of acres are devoted to the growing of the peach, which finds its market in Philadelphia, New York, Boston and Albany. The ground should be well prepared and in good heart, ploughed and harrowed thoroughly, and the trees two years old from the stone planted about 18 feet apart each way, giving about 125 to an acre. The orchard yields a full crop the third year, though there may be a half crop the second season. The orchards last in full bearing from ten to twelve years, and when cut down furnish a large amount of fuel, equal in value, when seasoned, to hickory wood. The produce varies very much; in a fair bearing year, the trees will average five baskets of ¾ of a bushel each. In 1849, there was almost a total failure, many orchards entirely without fruit—indeed all kinds of fruit failed; the cherries were diminished in number, and inferior in quality. The peach orchards which bore were richly remunerative, although they averaged not more than one-fifth of a basket per tree. Price, last year, $1 50 to $3 per basket. In full seasons, the price in Philadelphia varies from five to fifty cents, out of which the cost of picking, sorting, hauling, freight and commission on selling is to be paid, amounting from nine to fifteen cents per basket; to which add loss on baskets not returned, at least ten per cent., say three cents. Peach-growing is still increasing—new orchards are set out every season to meet the increasing demand. Land is, of course, rising rapidly in value. Improved property in New Castle county, according to its situation from market, will average from $65 to $100 per acre. Much of it in the middle and upper portions of the county is worth over $90. A farm of twenty acres, within two miles of Wilmington, buildings valued at $600, was sold in December at $300 per acre, $6,000. Unimproved, or but partially improved land ranges from $50 down to $10 per acre.

I remain,

Yours respectfully,

ALLEN VOORHEES LESLEY, M. D.

Hon. Thomas Ewbank,

Commissioner of Patents.

Lima, Delaware Co., Pa., *December* 3d, 1849.

Sir:—A copy of your circular dated July 1849, desiring information from "Planters, Farmers, and others on subjects connected with Agriculture," was received by the Delaware County Institute of Science, from the Hon. John Freedley, and the undersigned were directed to furnish replies.

The detailed report of our institution on the condition of the agricultural interest in this and the adjoining counties for the last year, published entire in the Patent Office Report for 1848 (page 436 to 454), to which you are respectfully referred, embraces a full, and it is believed, a correct view of the then and present *general* condition of that interest in this portion of the State; leaving little to be said at present beyond direct replies to your enumerated "points," and the accidental variations from season, &c. The absence of any legal provision in our State for obtaining precise statistical

information serviceable to you, necessarily renders our opinions and estimates somewhat uncertain, and confined to our local observation and experience, applicable with some degree of strictness to the counties of Delaware, Chester, Montgomery, Philadelphia, and Bucks. Under these conditions, we respectfully submit the following remarks to the queries in the order they stand in your circular.

Wheat.—Spring wheat has no place in our system of cropping; occasional experiments have uniformly resulted in failure, and no reliance whatever is placed upon it. A few samples received from the Patent Office, procured in Syria by Lieutenant Lynch, were experimented upon by a member of this institution with the usual result. Of winter wheat we have three varieties in use; the "red chaff bearded," which has maintained its popularity unimpaired for nearly half a century until recently, is yet preferred by many of our farmers for its exemption in a good degree from mildew and rust,* the stiffness of its straw, and for admitting of late sowing to avoid the fly, or when convenience renders it expedient. It is supposed to constitute less than a sixth part of our present wheat crop. The "Mediterranean," introduced in 1836, rose at once to general favor, and continues to be largely cultivated. Its exemption from the attacks of the fly on its first appearance, and its maturing the grain some ten days earlier than other varieties, were valuable properties; the latter of which it still retains, greatly lessening the chance of injury from mildew. The "Mountain," or "Steward" (regarded as the same variety), a white beardless wheat, introduced in 1846, early attracted public attention. The crop of 1848 was very productive, and it promised fair to drive others from cultivation, but on more general trial, it has not met the favorable anticipations formed of it, and it is believed that less of it has been sown the present than last year. Liability to rust, late ripening, small grain, and the comparatively light yield this year compared with last, are the objections. There are a few other varieties cultivated in this district to a small extent, mainly in the course of experiment. The average time of ripening is from the 6th to the 10th July, except the Mediterranean, which is nearly ten days earlier. The standard legal weight per bushel in Pennsylvania is 60 pounds; all our varieties will in ordinary years reach an average of 62 pounds. The "enemies and diseases" are the Hessian fly in autumn and spring, and rust and mildew occurring about the last of June. For the former, *late sowing* was resorted to (after the first frosts), but the plant necessarily remaining weak, suffered by the severe winter, and almost certainly by the fly in the following spring. Early sowing (10th to 20th September) has proved more successful, particularly when highly manured; the plant having produced strong roots is in condition to force itself forward, and in a great degree overcome the wounds inflicted by the fly. The heaviest crop is almost uniformly the result of early sowing. Our soil consists mainly of primitive formation of rock of various classes, nearly all of which are friendly to wheat, and will produce (within certain limits) in proportion to the state of the season. The quantity of stable manure usually applied at the time of seeding is from twenty to forty loads to the acre, and the best results have been observed when the manure remained *near or at the surface.* Leached ashes, hen-house and hog-pen refuse are very valuable fertilizers; for all which *guano* has been extensively substituted the last year, at the rate of two

* *Rust*, in the sense here applied, is restricted to injury to the straw, not to the grain.

to three hundred pounds per acre, with effect fully equal to the above quantity of stable manure, and its use is increasing. Soil constituted largely of clay is esteemed most favorable for the wheat crop, if the quantity of rain at the growing season be under the average and the temperature favorable; and *vice versâ*. Under our system of cultivation, wheat is the crop to which manures are most extensively applied, and it is rarely grown without it. The crop throughout the counties above named was very heavy in straw the present year, and in grain (not yet threshed) it is estimated equal to that of 1848, viz., 20 twenty bushels per acre, and 160,000 in this county. The cost of production, as furnished last year in detail, is $1 02 per bushel, or $26 46 per acre, after deducting $7 per ton for the straw.

Oats.—Several varieties of this grain have been cultivated within the last fifteen years. A white variety, long grown almost exclusively, and still to some extent, together with the common "black oats," are general favorites, yielding profitable crops, and weighing about 33 pounds to the bushel. They are sown from the 20th of March to the 20th of April, or later if convenient; and ripen from the 15th to the 30th of July. The crop the present year is very large, estimated to be an average of 40 bushels per acre, being an increase of ten per cent. on the crop of 1848, and making an aggregate of 272,000 bushels in Delaware county. The cost of raising is about 18 cents per bushel, and their market value at present 33 cents. Oats are extensively cultivated throughout Eastern Pennsylvania as a convenient crop on land growing corn the preceding year, previously to laying down with wheat and grass. It is deemed very exhausting to the soil, and would be generally abandoned, if any other profitable crop could be conveniently substituted, or if Indian corn could be removed sufficiently early from the field to admit of timely preparation for the wheat crop. Any of our varieties of soil *without manure* will produce a fair crop of oats, if the season is suitable; too much rain produces a heavy crop on strong land which often falls and perishes. Nearly the whole crop is fed to horses, cattle and hogs in the neighborhood; to the two latter, ground and mixed with an equal quantity of corn. Their average saleable value is about two-thirds that of corn, the best means of ascertaining their relative value as food.

Rye.—Until the last fifteen years this crop has been extensively cultivated in Eastern Pennsylvania. Previous to that time farmers generally cultivated a greater breadth of land in grain than they could procure manure to cover for wheat; the excess was usually sown with rye as most profitable. This state of things has been changed through the assistance of lime, &c. Each farm will now furnish stable manure to cover all the land which it is the interest of the owner to break up, and rye would of course, under these circumstances, be dispensed with. But about the time named, it was attacked by rust on the straw after shooting the heads, almost entirely blasting the grain, and causing much of the straw to perish and fall. Very little has since been grown, but a few parcels are occasionally observed, which appear to do well, particularly on serpentine soil, where it would appear to be nearly exempt from the disease. Many farmers attribute the failure to the application of lime to the soil, so extensively practiced of late; but it is a question of no practical importance in this vicinity at present, for the reasons given.

Barley, previously to 1818, was extensively cultivated in this section of the State, and consumed by neighboring brewers. The value at that time averaging about one dollar per bushel, rendered its cultivation more profit-

able on strong land than oats, as a crop intermediate between corn and wheat. The subsequent diminished value of barley has reversed this condition, and it is now almost entirely banished from our cultivated fields. The samples procured by Lieutenant Lynch in Syria, and received through the Patent Office, were tried with rather discouraging results.

Corn.—Under our system of cropping (corn, oats, wheat, and grass), this is by far the most important and profitable. Fresh-broken sod ground is usually appropriated to its culture, and will produce from twenty-five to seventy-five bushels per acre, as the soil and season is more or less favorable. Different varieties are frequently introduced, but all are found to assumé, to a certain extent, a common character after a few years' cultivation. No new variety is known to have suffered deterioration, in valuable qualities; on the contrary, many kinds have been greatly improved from being cultivated here.

The writer received from a friend in 1838 a few ears cultivated by him for the purpose of replanting any portion of his regular crop which might fail, as it arrived at maturity as early, though planted four or five weeks later than the ordinary varieties. Its continued cultivation up to the present time for the same purpose, with and near other kinds, has resulted in a marked improvement in the quantity produced, and in the character of the ear and grain, while it still retains unimpaired the valuable property of maturing early.

A sample of the *Lloyd Corn* was received by our Institution from the Patent Office in 1845, and submitted for experiment to the writer, and it has since been grown in larger quantities. Fears were entertained that our seasons (lat. 40°) would be found too short for maturing the grain, but they proved groundless. By planting not later than the 26th of April, no instance has occurred of its failing to ripen thoroughly previous to frosts. In the size and length of the ear, and also in the time of maturing the grain, a considerable improvement has been observed; while it still retains its pure white grain and prolific qualities, producing generally two or more fair ears on each stalk. It is less liable to be injured by the drouth than other kinds, and for this reason is often planted on the most exposed and poorest situations in the field, with highly satisfactory results. The present year's crop of corn in the counties before named is very large, owing to the highly favorable season. The average is estimated at forty-five bushels per acre. The large quantity of rain in August retarded the process of ripening, while it added greatly to the quantity of grain. Ample time, however, was afforded for thoroughly maturing the grain; and though a severe drouth prevailed in the middle-southern counties which somewhat diminished the product, it is believed that the crop of Eastern Pennsylvania is fully equal to that of 1848.

In your Report for 1848, we perceive that much has been said on the comparative value of corn-stalk and straw fodder as a substitute for hay; and also that a great error is made in estimating the value of the former in this county. In our statement for last year, from which we presume the prices in our county were obtained, the value of corn-stalk and straw fodder was given at five dollars per ton for food, and two dollars for manure: equal to seven dollars per ton, or seven dollars per acre, for all land cultivated in wheat, rye, oats and corn, estimated at twenty-four thousand acres in this county. Our individual experience fully justifies us in the above estimate in this vicinity. By corn-stalk fodder, we would be understood to mean the

stalk with the husk and blade upon it, cut and cured while yet partially green and the ear ripe. Interest and experience have led to the more economical practice of preserving the stalk with the blade and husk upon it, in preference to stripping away the blade and leaving the stalk to perish. Corn fodder in any form is highly relished by all kinds of stock, and its value is fully appreciated here.

No thorough and systematic experiments are known to have been made to determine the comparative value of corn ground or whole as food for stock.

The practice with intelligent farmers is to feed corn *ground* with an equal quantity of oats, mixed with cut-straw to work horses and dairy stock—*corn-meal* to beef cattle, and *whole corn* to hogs under process of fattening. In the latter case, corn and oat-meal mixed and fermented is sometimes used. Partial experiments by the writer justify the belief that corn *boiled whole* to a soft state will greatly expedite the process of fattening hogs—but an equal solidity of the fat is doubtful. Dairying for the Philadelphia market being the leading business in the five counties here especially referred to, the system of cropping is chiefly adapted to that interest. The relative proportion of cultivated fields is steadily increasing. This together with the improved fertility of the soil necessarily produces an increase of grain crops, estimated at five per cent. per annum. This rate of increase will probably be maintained under the operation of these causes for many years to come.

In the absence of positive data, we venture to give the following view of the grain crops of Delaware county, and a comparison with those of last year:—

	Average crop per acre, bushels.	Average increase per acre, compared with 1848.	Cost of production per bushel.	Aggregate crop. Delaware county.	Usual weight per bushel.	Legal weight per bushel.
Wheat	20	equal	$1.02	160.000	62 pounds.	60 pounds.
Oats	40	10 per cent.	.18	272.000	33 "	33 "
Corn	45	equal	.20½	405.000	58 "	56 "

Hay.—The crop of hay secured the present year was very large, supposed to average 1¾ tons per acre of clover and timothy mixed, and 1½ tons from natural meadows. Timothy is esteemed the most valuable hay for horses, and clover and timothy mixed in equal quantities for horned cattle. Clover alone is not relished by any description of stock. Natural meadow hay, except from swampy ground, is next in value to mixed timothy and clover, for horned cattle, and is preferred by them to all others if necessarily confined to either. Timothy and clover separately form but a small portion of our hay crop. The former is sometimes seen alone when from frequent cropping the clover has run out, and the latter in fields when the timothy has accidentally miscarried. Timothy seed is usually sown at the rate of four to six quarts per acre with the wheat crop in autumn; and clover in equal quantity in the following March or April, and generally depastured the succeeding year, and cropped for hay the second or third. No new process in curing hay is practiced with us. It may, however, be remarked that within thirty years past a great change in the usual method has occurred. The thorough curing formerly deemed indispensable has been repudiated. The best quality of hay is now secured after one fair day's exposure to the sun, previous to storing.

The eastern counties of Pennsylvania everywhere show the high estima-

tion placed on artificially watered meadows, by our ancestors, before the introduction of artificial grasses. Before the year 1800, these, together with the lands subject to a natural overflow from streams, were their only dependence for hay. Such lands are yet esteemed by many as the most valuable appendage to a farm, producing without manure perennial crops sufficient to enrich and maintain the fertility of a large proportion of upland. In many instances owing to the increasing value of land and greater abundance of fertilizing agents, lands once irrigated as meadows have been brought under cultivation with but doubtful advantage to the owner. The immediate and permanent beneficial effects of irrigation are uniformly observed on any of our varieties of soil, and but for the above reasons it would maintain its original popularity.

Root Crops.—Irish potatoes are cultivated in the counties named, generally in quantities equal to the consumption, and confined almost exclusively to table use. In the vicinity of Philadelphia, much attention is given to raising them for that market. The crop of the present year is larger than usual, estimated at 140 bushels per acre, and 187,600 bushels in Delaware county. Cost of production twenty-six cents per bushel. Owing to early planting the crop was generally ripe and secured before the heavy rains of October, and thus escaped the disease. Those remaining in the ground as late as the 21st of that month, were in many instances attacked, and a large portion destroyed by the rot. Sweet potatoes, turnips, carrots and beets, are cultivated merely as garden vegetables for family use.

Butter.—We have no data for estimating the quantity made in the State. The average product per cow for the present year is estimated at 140 lbs. (being 15 lbs. greater than last), and the whole quantity in Delaware county at 1,190,000 lbs. This estimate per cow is intended to apply to all regular dairies in the five counties before named; where, from the tolerably equal distribution of rain during the past season, a sufficiency of pasture was obtained. Westward of this section, a great scarcity was caused by drouth from May to October.

An opinion formerly prevailed that the comparative excellence of butter produced in the vicinity of Philadelphia, on the western side of the Delaware River, was attributable to the superior quality of the spring water employed in its preparation. Though still generally believed, the result of experiments has led to the belief that the quality of the butter is influenced by the hay, grass or water on which the cattle subsist. Many dairy establishments are now conducted without the use of spring water, in well ventilated milk-houses; and others in spring-houses, where during several of the dry months the water entirely disappears without perceptibly diminishing the quantity or deteriorating the quality of the butter.

The production of cheese is too limited in this section to warrant any reply to your queries.

Horses and Mules.—The value of good farm horses in this section of the State ranges from $75 to $125. About one-half of those in use are raised on our farms; the balance are procured from Ohio, and the western districts. No mules are known to be raised or employed in farming operations.

Horned Cattle.—We have no means of estimating the number in the State. The cattle raised in the counties named consist of a comparatively few from choice stock for the dairies, probably not exceeding one-eighth of the whole number in use; average value at 3 years old, $18. Our chief

dependence to keep up the necessary number is on the adjoining counties westward and northward. The number of dairy cows in this small county is about 11,000, and in each of the other four counties a greater number, which require to be renewed about every six years, at an average cost of $22 per head. Our native breeds are generally preferred for their superior dairy qualities, and comprise nine-tenths of the whole. The supplies of working cattle, and stock for fattening, are renewed from Western New York, Virginia and Ohio.

Sheep Husbandry has been abandoned as a business in this section of the State. About 25,000 are annually driven from the western counties of the State into Delaware county, after the wool has been clipped, and are here fattened and slaughtered for our own and Philadelphia consumption.

Hogs, raised on the farm, are generally killed at 15 months old; average weight 250 lbs. net; cost of production estimated at 4 cents per lb., and consumption per head, by our population, about 100 lbs. annually. Small pork, fed on the refuse of dairies, is generally sold at 5 or 6 months old in the Philadelphia market, and will average 80 lbs. each. (See Report for 1848, page 450.)

Plaster and other Fertilizers.—Plaster is extensively applied to crops of clover and other grasses, and to corn—and with highly beneficial results on every variety of soil. Street dirt from Philadelphia, Guano, Poudrette and Bone-dust are considerably used, as assistants or substitutes for stable manure. Guano is becoming popular as a dressing for wheat, turnip and corn ground; and though comparatively expensive, its use is rapidly increasing. But the grand auxiliary fertilizer of our primitive soils has been *Lime*. Nearly all the cultivated land in Eastern Pennsylvania, has been treated once or more with lime, varying from 40 to 100 bushels at each application. Many close observers deem 25 to 40 bushels per acre, repeated every 10 years, the most judicious mode of application.

Orchards, &c.—The diminished demand for cider as a beverage has produced a corresponding diminution in the attention formerly bestowed on the cultivation of apples for that purpose. But those varieties of apples and other fruits suitable for table use have recently become objects of increased interest. The crop of the present year was very light and of inferior quality; owing in part, to the drouth, and also to the depredations of a minute insect which infests the bark, leaves, blossoms and fruits in May, June and July. Peaches, plums, cherries, &c., failed to an unusual extent. Raspberries and strawberries succeeded well, and as a profitable crop probably exceed any other to which the attention of gardeners in the vicinity of Philadelphia has been directed.

Grapes, &c.—The cultivation of grapes, for domestic use, has greatly increased within 20 years past. The Catawba, Isabella and Schuylkill are the favorites, well adapted to our locality, and will, with proper attention, make ample returns for the labor bestowed upon them. The usual mode of propagation is by slips. A much more speedy return of fruit, however, on a small scale, may be secured by transplanting our native *Fox grapevines* into the desired situation, and the second year, when the frost is leaving the ground in spring, engraft the desired sort upon the stock in the usual manner practiced in nursery grafting. The writer has thus uniformly succeeded in securing early and abundant crops of a quality not inferior to those produced from cuttings. If the season is dry, the roots of the vine

should be protected from the direct action of the sun on the contiguous soil, and the consequent evaporation of the moisture, during the months of July and August.

The above brief notices of the several crops in this vicinity, in reply to the queries proposed in your circular, are respectfully submitted by

Your obedient servants,

JOSEPH EDWARDS,
JOHN MILLER,

Committee of the Delaware County Institute of Science.

Hon. THOMAS EWBANK,
Com. of Patents.

WOODLANDS, MONTGOMERY CO., MARYLAND, *January 18th*, 1850.

SIR:—Your circular dated July last only reached me a few days before Christmas; since which time I have not had leisure until now to consider the various subjects of inquiry it embraces.

Approving highly of the object and purposes of those queries, it will afford me pleasure if anything I can communicate in reply to any of them will contribute to so desirable a purpose as you contemplate.

My residence is near the centre of Montgomery county, and the soil, inclining to red, is rather a stiff clay; the country is beautifully undulating, and therefore requires but little ditching, except the bottom lands in particular spots. The high lands are admirably adapted when improved to the growth of wheat, oats, and corn, and are, I think, less injured by an excess of either moist or dry weather than any lands I have ever noticed.

Wheat.—For many years I confined myself to raising the "red chaff bearded" wheat; this kind succeeded better on thin lands than any other variety; but of late years I find the *Zimmerman* and *blue stem* succeed best, particularly when guano has been sown with them. The *loss* from shattering is less in those kinds while cutting, securing, and hauling; which amounts to considerable in a crop of the red bearded wheat, if left until fully ripe. I tried the *Mediterranean* one year, which, from being sown late I presume, proved a failure, and I have never used it since. I rarely or never sow my wheat before the first of October; and since I have adopted late sowing it has never been injured by the Hessian fly, an enemy from which early-sown wheat has received greater injury than from any other. This was particularly the case last year. I saw a number of fields so much injured by these insects that, instead of wheat, from one-third to a half of the products from them was nothing but *cheat*, which I consider a proof of the theory I advanced in my letter to your predecessor, published in his Report for 1848, page 471—that "cheat" is nothing more nor less than *degenerated wheat;* and here permit me to correct an error (in printing I presume), in another letter, page 470. It should be "twelve to fifteen *thousand*" pounds of wool instead of that many *hundred*.

Oats.—I have been in the habit of growing the common white kind, but last year I tried the black variety, which yielded a large crop and proved much heavier than the common white. Considerable quantities of oats are raised in this county, not, I believe, because they are a popular crop, but because they generally succeed better after a crop of corn than any other small grain on our thin lands; and they find a ready sale in the district. Mixed with corn (half and half, or two of oats and one of corn) and chop-

ped, they make a nutritious feed for horses, and have been very much used in this way, since the failure of the common rye.

Rye.—The common kind has been unproductive for many years; the multicole variety however is becoming popular and sought after. I have grown it for several years, sometimes on good and sometimes on thin land; but always with success; the yield, however, pretty much in proportion to quality of the land on which it was grown. One of my neighbors last year reaped from a poor field 160 bushels where 8 bushels had been sown; he had, however, turned under a large dose of guano with the seed; the straw on this field was eight feet and upwards high; my crop averaged from five to six high on thin land, without any kind of manure, notwithstanding it was sown in December, and was scarcely visible before the spring, and then retarded by the drouth.

Barley is not grown in my neighborhood. I sowed some one year, which produced upwards of forty bushels per acre, but from its rapid growth I considered it an exhauster, and never repeated the experiment.

Corn (*Maize*).—I have for the last twenty years planted two kinds—the *white* on my best land and the *yellow flint* on thin land, and during that period there has been no perceptible change in the appearance or general character of either. The *white* was introduced here from Frederick county; the ears are large, the grain broad and deep, and slightly indented.

When ground, the meal is as white as family flour, and is generally preferred for bread—the yellow is, perhaps, heavier and more nutritious, and principally fed to hogs and cattle; some however prefer it for bread.

From my experience, I think nothing but necessity should induce the feeding of corn whole to either horses or cattle; because when so fed a considerable portion escapes mastication, and is evacuated without being digested, and such portion instead of benefiting is injurious to animals. My practice is to crush the corn and cob and grind them together, which saves the animal in a great measure the labor of masticating, and it is consumed with avidity, and he thus receives the full benefit of the corn and of whatever aliment is contained in the cob, which I compute at fully one-third more. The shucks are perhaps something more nutritious than good wheat straw for cattle, which is the only use I have ever made of them. In reply to your *Note*, it would be next to impossible to arrive at the actual cost of producing the above-enumerated grains per acre, because the labor required in cultivating an acre of *good* land is no more than that of an acre of *poor* land, whereas the product from the first is from five to ten times greater than that from the latter.

A spirit of improvement, however, is abroad amongst our people, that promises to render Montgomery one of the most productive (as it is among the most healthy and salubrious) counties in the State. By the aid of a friend on whose information I could rely, and from my own knowledge, we have ascertained that *eight hundred tons* of guano have been purchased and used in this county during the last year, besides other fertilizers to a considerable extent. Large as the amount was, the benefit is only discovered "about in spots." The want of a cash capital only prevents the immediate, I may say, almost *magical* improvement of our soil. I was delighted last summer in meeting wagons returning from town with their guano, some with full loads, others with a few bags; all perhaps bringing according to their means. It is, however, to be regretted that the price of guano continues too high for general use. I consider it the best renovator

that can be applied to our lands in their present condition, particularly that from Peru—its effects are immediate, and by pursuing a proper course, I believe may likewise be rendered durable. I have used it for the last five years with decided advantage, and as the system I have adopted I believe differs from most others, I will give a brief statement of facts by which it may be considered. On the first application of guano it was sown with the wheat in October, and during the following winter clover was also sown on the land—after the harvest, the hogs were turned in to glean the scattering heads for a short time, after which no other hoof was allowed to pass over it. The following spring, plaster was sown on the clover, and the clover was allowed to mature its seed, and then the entire mass of clover and seed was turned under by the plough, and the land again sown with guano and wheat. The second crop of wheat was about seventy per cent. better than the first, and the young clover from the seed ploughed in, beautifully set over the field, thus alternating with clover and wheat. My lands thus treated have certainly increased in product from fifty to one hundred per cent., and only required to be sown with clover seed the first time. Year before last I cut the first crop of clover seed with cradles, taking off only the tops, and suffering the seed on the second crop to mature, which was turned under in fallowing. The seed I obtained was considerably more than I had expected, but the young clover is not so well set as I could wish, owing, perhaps, to the great drouth of last year. The kind of clover originally sown on this field is called the *early red.* For rapid improvement, I prefer what is called *sapling* or late clover, the stems of which grow from three to five feet long, producing a much heavier mass of vegetable matter to be turned under. My calculation is that by pursuing this rotation for a few years, and then treating the land to a suitable quantity of lime, it may be rendered permanently productive without much additional expense.

I will here add an experiment I have been carrying on for the last sixteen or eighteen years, which possibly may be advantageous to those living too remote to procure guano conveniently. A small field of 12 or 15 acres very much exhausted, I sowed the first year in oats and clover, applying a tolerable sprinkling of plaster and ashes at the same time. Both succeeded as well as could be expected—the spring following plaster was sown on the clover, which grew finely, and in the fall it was turned under, *seed and all,* and the land sown with wheat, since which I have sowed it every other year with wheat, the clover always reproduced from the seed turned under. The crops of wheat and clover improved every year, and have been considered very fine for this section. In 1847, however, I found it necessary to put in a cleansing crop in order to destroy some running briers that had encroached upon it, and I therefore had it broken up in May, when the clover had advanced considerably, and planted corn. The corn escaped injury from the wire-worm, that was very destructive to many crops that year, and yielded about an average of 8 barrels per acre, notwithstanding the drouth it had to contend with. The succeeding year it was in oats, and produced a fine crop of clover likewise, from the seed turned under in previous years; the clover was turned under last fall, and the wheat now growing on it is *hard to beat!*

One great advantage I have derived from suffering the clover to remain only one year before being ploughed under, is, that the land thus treated has escaped injury from *blue grass,* which invariably, under the *old system* of permitting clover to remain two years on the ground, became so much

intermixed as greatly to injure the wheat crop, and I found it necessary in order to destroy it to work the land in some open crop: thus nullifying, in a great measure, the benefit derived from the clover hay; whereas, by the course I have pursued, a gradual but great improvement has been made, and I believe only now requires a portion of lime to make it permanent.

Very respectfully, &c.,

F. C. CLOPPER.

Hon. THOS. EWBANK,
Commissioner of Patents.

CUMBERLAND COUNTY, VA., FARMVILLE P. O., *Nov. 6th*, 1849.

SIR:—During an absence of several days from home, I received from Stony Point Mills (not my Post Office), a package containing five circulars from your office, one of which I retained.

I shall proceed to make out my report, lamenting both my own incompetency to do justice to the matter, and that condition of our agriculture, which might give to a simple statistical account of our doings, without any explanatory statement of our many wants and difficulties and the causes which have produced them, an appearance of the work of a spy upon our leanness.

Unaccompanied by such a statement, I could hardly be induced to tell what might operate as a slander on the region of my birth, and on my brethren of the plough, whom in many of the best qualities of humanity I consider as unsurpassed by any people on earth.

In the front rank of our difficulties, I would place the fact, that the locality of our congressional district is in the very heart of the Virginian tobacco region. To the cultivation of this weed may we justly ascribe the wide display, in our lands, of old field pines, broom-straw, poverty-grass, naked galls, and yawning gullies. Our forefathers, finding themselves at too great a distance from market to cultivate any other as a *sale* crop than tobacco, established its production as their chief reliance, and it has been entailed by the strong bonds of national custom on their posterity, who have been hewers of wood and drawers of water to this modern Pharaoh, down to the present day.

It is pleasing to find that there are a few bold-spirited pioneers, who have discovered that they cannot afford to cultivate tobacco, and have successfully resorted to other objects as money crops. They, however, generally live much nearer to market, and enjoy much better means of transportation than the people of this district. A few of us are humbly following their example, but with cautious and trembling steps, along the dark, difficult and untrodden route, uncertain whether by forsaking the beaten road, on which Poverty seems to have hung out a broad sign from her gloomy hostelry, we may not meet a speedier precipitation into ruin. The fact is alarming, that with greatly increased anxiety and exertion among agriculturists, but few of them (in this region) seem to be prospering. Their broad acres, by rapidly successive drafts, with no returns of manure, have been constantly turning to dreary wastes, while the means of manuring even tobacco lots have been steadily diminishing. Moreover, the seasons, for a series of years, have been unpropitious for making good tobacco, and its price has been low. At the same time, gradually increasing luxury and extravagance have introduced a largely augmented amount of foreign merchandise, while the deterioration

of our lands has forced us to rely on the West for most of our pork and much of our beef.

It may be asked, Why do you continue then to cultivate tobacco? It is much easier to ask than to answer questions. A drowning man would never catch at straws, were something more substantial within his reach. We would gladly relinquish the tobacco crop if any other means could be devised of meeting demands upon us. This might be done under either of the following contingencies—could our avenues to market be so improved as to allow articles of less value, in proportion to weight, to be transported profitably, and lime, as a manure, be introduced at remunerative prices, or could numerous towns, villages, and manufactories be established so as to bring a market to our doors.

Another of our difficulties arises from our destitution of lime. I reside on the Appomattox River, the southern boundary of Cumberland county. Within my own knowledge, about twenty tons of guano will be used in this part of the county for the wheat crop this fall. I know not what the James River farmers on the northern boundary will do in this way. I suppose they will raise the amount to much more than double that quantity. I have already heard of more than 100 tons being purchased for Powhatan, the next county below us.

Costly as lime is rendered by the expense of transportation, some few have dealt considerably in that article recently, with strong hopes of bountiful remuneration.

Another obstacle to our agricultural improvement has been that from the days of Patrick Henry and John Randolph, we have been warm politicians. This has greatly interfered with our success as cultivators of the earth. But it is cheering to reflect that although warm partisans we are liberal ones. Being almost equally divided, we contend vigorously, but the warmest friends are frequently found in opposite ranks, and we think each other *fools* in nothing but politics.

Adverting more particularly to the inquiries in your circular, I fear I shall have but a lean account to render.

Wheat.—The favorite varieties of this grain are: 1st. The *Turkey*, called also *Siberian* wheat. A small parcel of this was brought from South Carolina by the late Rev. James Wharey and divided between the late Captain Pemberton and myself. This variety is excellent, weighing remarkably and making superior flour. It is now nearly lost in this neighborhood from admixture and other causes of deterioration. 2d. The *Etrurian*, which I now cultivate, and although much mixed before I procured the seed, I prefer it to any other variety within my reach. It yields a good crop of large grains, which weigh heavily and make first rate flour; ripens next to the varieties of May wheat. 3d. The *North Carolina* wheat. This has recently been introduced. I have not seen any of it, but believe it to be one of the very best varieties. 4th. The *Chilian* wheat, introduced by Dr. Crump of Powhatan, and probably not surpassed by any variety among us. I have not seen it. 5th. The *purple straw*, greatly admired in some neighborhoods; it has not succeeded well in my own. I have seen none of it that I would sow on account of the quantity of spelt intermixed. The grain is small and the accompanying spelt beardless—to me a new variety of this pest. 6th. The *white-bearded* wheat, a valuable kind less liable to total failure than almost any other; not very popular with millers.

Among the enemies and diseases of wheat, there are none that I consider

formidable except spelt, Hessian fly, blank heads and rust. The smut some twenty or thirty years ago was alarming, but I believe it has nearly gone out of fashion, whether from the saline soakings used with subsequent rolling in lime, I know not.

Spelt, but recently a stranger, is becoming entirely too familiar amongst us. I have known several families badly poisoned but not killed, by eating spelted bread. I am endeavoring to exterminate it, and believe I shall succeed by the most searching watchfulness to cleanse my seed, and by early fallowing before the volunteer spelt and other nuisances shall have matured their seeds, then sowing down and raking in the Bass or cow-pea, and refallowing for wheat in the fall.

From one year's experience I trust that my fields will thus be cleansed, that the pea haulm will (as a green crop) be about equal to the *prevented* second crop of clover, and that those of the peas not gathered for seed will greatly assist in preparing hogs for slaughter, or if turned in will serve as a valuable fertilizer.

The Hessian fly is often very destructive, especially to early sown wheat. It seems to be a point almost yielded, that there is no other way of warring against the myriads of these little enemies but by incommoding them as much as practicable with cold weather, by our time of seeding.

The opinion may be ridiculed, but I feel bound to state it, that, in whatever other ways this enemy may be propagated, its egg is deposited in the germ of the grain, and that its ravages may be greatly lessened by dipping the basket of seed in boiling and then in cold water. A running stream is best if convenient. This has been faithfully practiced at my suggestion for thirty years, by a relative of mine in Prince Edward, and though he finds it very troublesome, he persists in it, thinking himself well remunerated.

The same end might probably be attained by thoroughly greasing the seed, and dusting well with flour of sulphur. Two well attested facts came to my knowledge, many years ago, of Hessian fly making its first appearance, in a new region among wheat, the seed of which was brought from places where the insect existed before. I will not, however, undertake to deny that the egg is also often deposited in the young blade.*

Blank or grainless heads are becoming a serious evil in wheat; what produces the malady I know not, unless it arises from a want of that sort of nutriment in the soil which is necessary to the formation of grain; and I look with solicitude to the modern concentrated manures as the remedy. It has certainly been a great evil in our wheat crops for several years.

The rust I feel assured may be greatly obviated by early sowing, and by so shaping and smoothing the beds, and graduating the drains, that there shall be no receptacles in which water may stagnate and putrefy. Our seeding has been so much hindered by drouth in the summer and early fall, and by so much rain of late, that I fear the crop may suffer much from rust. We never before were so late in seeding wheat. It has been the prevailing opinion that red or clay soils are peculiarly suited to the production of wheat.

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* Our correspondent confounds two insects, both flies it is true, but one deposits its eggs in the seed as he suggests, and the other in the sheath of the young wheat.

Of the latter, two generations grow in a year; of the former, only one. The wheat fly, *cecidomya tritici*, attacks the seeds; the Hessian fly ("cecidomya devastator") attacks the stems of the plant near the ground. It is an easy matter to hatch larvæ of both insects, and every wheat-grower should be familiar with their habits and transformations.

But there is a vein of gray land in my neighborhood, usually called the Guinea vein, abounding in felspar and in many places entirely underlaid with that stone. I have never seen wheat of as fair grain raised anywhere else as on this vein, when the season was not too wet. The flour from this wheat has long been celebrated as family flour.

As to manures, it has been too common until recently to apply but little on any crop except tobacco; the consequence has been that the wheat made on other than tobacco lands rarely more than paid the cost of production.

Lately many planters have annually prepared new lots for tobacco, converting the old ones into wheat and clover lands. This has been, so far, introducing the fallow system, and an improvement. The practice of top-dressing wheat lands with the stable manure made in summer has been of late getting more common.

I feel utterly unable to give the statistics of our cropping in this district. The lands are of such varying fertility, and the skill employed in the different localities so variable, that I can form no idea of the average product. The lands on the large rivers Staunton and the James can hardly be excelled, and the agriculture on the latter (so convenient of access to Richmond) is like gardening. I understand, however, that it has become a proverb, "If you want a good dinner go upon the river. If you wish to borrow a hundred dollars go on the poor ridges."

Oats.—I have tried the common black, and the Russian or ruffled oats. Both answer well. The latter grows taller on poor land than the former, and ripens too late to interfere with wheat harvest. It is apt to *tumble* on rich ground, its straw being weak. I prefer the former on the whole. Oats are used largely among us, growing better than any other crop on our thin corn lands. It affords good feed for horses and oxen, and is used with a view of saving Indian corn.

Rye.—A new variety of this grain called the *multicole*, issued originally from the Patent Office, has lately reached my neighborhood from Lynchburg. The crops from which it came were extraordinary. It has been sown by a gentleman near me on trial—as horse feed. Common rye, from what cause I know not, never prospered in this region, and its culture has rarely been attempted.

Barley.—This grain I believe is properly cultivated on the shores of the Chesapeake, for the Baltimore breweries. It is not raised here. I have long thought our light thirsty soil and hot sun admirably adapted to its growth, and that it would make about the best substitute for the exhausting Indian corn crop, if used in feeding stock. The fine horses of Arabia, I believe, get no other grain. I judge that our ignorance of the mode of *hummelling*, I believe it is called, or divesting it of its awn, or beard, has prevented its introduction and use.

Indian Corn.—There are many varieties of this grain raised in our district. The large-grained kinds seem to suit it best. Of these I believe the old-fashioned Tuscarora is the most popular. It is a large, long-eared, white and heavy variety. Some planters mix this with the Dearing variety, which has a multitude of grains on the cob. They plant the latter among the former, in several alternate rows, cutting away its tassels in due time, thus fixing the large-grained kind on the many-grained Dearing cob. My opinion is, that weight in corn is an unimportant consideration. Twice as

much of the lightest kind may be raised on the same land as of the heaviest white; it is probable that the amount of nutriment is about equal.

The corn-seller, however, might find it for his interest to cultivate the lightest, as with us all grain is sold by measure, except wheat. Sixty pounds of wheat is the legal bushel. I consider the best corn-blades as superior forage to shucks, hay, or anything I ever tried. I think ground grain better than whole, and cooked better than raw. I have had too little experience in soiling with green corn to give an opinion.

Hay.—This is by no means a grass country, and there are but few meadows. Most of our good managers depend on clover hay for forage, reserving their flat lands for more valuable crops. The *real tobacco growers* keep but little stock, and that in poor condition; relying on corn-tops, shucks, and wheat straw as food.

Those who have meadows manage them with varying skill and success. From one to three tons is the crop. They use herds-grass, and red-top, chiefly mixed with clover. Two varieties of native grass, the Randall and Mountain evergreen, are beginning to attract great attention, particularly among sheep-breeders. Our free-stone water is not well suited to irrigation; it hurries the invasion of broom-straw by souring the land, which without irrigation will run to broom-straw in four or five years. I have frequently thought that we might irrigate to advantage with water percolating through lime, or lime mixed with some renovator containing a goodly portion of phosphates.

Peas.—But few cultivate peas except for human food. The red or Bass and the black cow-pea are most esteemed for field culture. They are exceedingly productive, average crop per acre unknown. Peas have no market price among us, but are freely given from one neighbor to another when used as a family vegetable. The cow-pea for field culture has sold for one dollar per bushel.

Sheep Husbandry.—On this subject we are just beginning to awake. It is mortifying, in so many cases to state what we might do instead of what we have done. But what we might do in sheep husbandry ought to be known. A traveler must have observed but little who has not noticed the remarkably fine appearance of some of our best native flocks. Such observations have induced some most valuable men to remove from New York into middle Virginia, bringing with them large flocks of Saxon-Merinos. There are also some fine specimens of Southdown, Cotswold, and Bakewell sheep in course of rearing amongst us. A few triumphant manifestations of the improved growth of grass upon sheep-walks can be exhibited, showing the mutual dependence of the animal and vegetable kingdoms. The devout farmer loves to witness such wise provisions in the economy of nature. As to sheep killed by dogs in Virginia, the number is incalculable.

Plaster and other Fertilizers.—The quantity of plaster has been regularly but slowly increasing. It acts surprisingly on some soils, especially such as contain felspar and horn-blende. It rarely does good, as far as my observation has reached, on lands which crop out no other rocks than quartz. I consider this a confirmation of Mr. Ruffin's theory, that there is acid in some soils, decomposing the plaster applied, which must be neutralized by lime before the plaster can do good.

Fruits.—I have been informed by old people that frost rarely injured fruit while the country was mainly covered with forest. Much attention was

then paid to orchards, and some of the old trees, bearing fruit of the finest character, are still standing.

In modern times, the crops of fruit are very frequently cut short by frost. A few of the lovers of fruit still attend diligently to fruit trees, and when the season suits, are rewarded by as fine apples, peaches, pears, plums, nectarines and apricots as the world ever saw. Generally, however, this matter is much neglected, even by the greatest lovers of fruit.

Grapes.—The vine does not bloom in this section until the danger of frost has passed, about the middle of May. The flavor and quality of the fruit depend more on soil than any other I have ever cultivated. The same variety is often luscious in one locality, and sour or insipid in another, even where the manuring and treatment are similar.

The best grapes I have ever raised, grew on (naturally) poor chestnut-oak quartz land, with a stiff red clay substratum, and of a very thirsty nature. I have succeeded much better by training them on arbors or scaffolds 8 or 9 feet high, than on espaliers. The grapes on an arbor hang from their weight below the leaves, and enjoy air more freely, and are less accessible to insects and birds. A kind of blight is their principal disease. On close scrutiny, a small speck, sometimes two, may be observed on each grape, which spreads most rapidly until the whole berry gets to an ashy hue, and withers. I think it may be obviated considerably by elevating the beds on which the vines grow above the surrounding levels, and keeping open drains to carry off redundant water. These specks may, however, be the work of insects, whose marauding I have never been able to detect.

For vines, I mix manure from the hen-house with effete lime, old plastering, or ashes. I raise grapes only for table use, but think there can be no doubt but that wine might be profitably made in Virginia, and might constitute one substitute for the tobacco crop. He however who calculates on making general and sudden changes in national pursuits, will be the dupe of something like the multicaulis humbug. It has taken the French people centuries to learn how to make wine and silk, and we could hardly do it *off-hand.*

The foregoing, written at hurried intervals, with many interruptions from other cares, is most respectfully submitted—that it greatly needs condensation, which I have not time to give it, is very manifest and much regretted.

With best wishes for your success in the discharge of the most arduous duties of your high and responsible office,

I am, most respectfully,
Your most obedient,
W. S. MORTON.

Hon. Thos. Ewbank,
Com'r of Patents, Washington, D. C.

Buckingham Co., Virginia, *November* 1849.

Sir :—Your circular reached my residence while I was absent at our different watering-places, and some time being necessary to seek information upon the great variety of topics embraced in the circular, will account for the delay in not responding sooner.

First, of the wheat crop, "time of seeding, harvesting, &c." Our farmers generally cut up and stack their corn from the 15th to the 20th of September, and about the 25th commence seeding wheat; the quantity of seed

being from 4 to 5 pecks per acre upon corn land, and 1½ to 2 bushels upon tobacco land. Our time of harvesting is generally about the 20th June. As to varieties, there is a great diversity of opinion; we have the *mountain purple straw; Mediterranean; Turkey; white* and *red May; New York white flint*, &c. &c. All kinds have their favorers. When one variety fails in bad seasons and rough culture, the farmers are post haste in pursuit of some new kind. I am governed by two considerations only; *early ripening* and a *strong straw* not subject to fall. Wheat is at best a delicate and uncertain crop, subject to two great disasters, *rust* and *mildew;* and also the Hessian fly and china bug. The two last are not by any means as destructive as the former. In favorable seasons I estimate 10 to 15 bushels per acre a good average yield.

The standard weight of wheat is by law 58 lbs. to the bushel, but millers buy at 60 lbs., that being about the average weight of a perfect crop. As to the cost of cultivating an acre of wheat or corn, I would refer you to my communication published in last year's Patent Office Report, where the "printer's devil," or somebody else, has christened me *Charles Taney* instead of *Charles Yancey.*

Oats.—This crop is but little cultivated, there being no market for them except in our villages, in the small way, or from one neighbor to another in barter. Their value is about one-half that of corn. The kinds cultivated are the *black, white, large potato* and the *ruffled;* the latter suits our poor land the best, as they grow six inches taller, but the black oat is generally preferred, being the heaviest. It is not a popular crop, as it brings very little money, and is known to be a great exhauster of the soil.

Maize, or *Indian Corn.*—Varieties, *white* and *yellow gourd-seed, flint*, &c. The white gourd-seed is usually preferred, as it makes the best bread, and is equally productive. Time of ripening is unimportant, as every kind planted in May will ripen before a frost. We consider corn the staff of life, and principal food for man and beast. It makes fat horses, fat bullocks, and fat hogs, and a Virginia housewife would think she had a poor dinner if the table was not graced with a fine ham of bacon. With an ample supply of corn, we are not compelled to peddle in root crops as they have to do in England, and other northern latitudes where they cannot grow corn. This grain will mix as far as the winds blow the pollen or farina from the tassels, which impregnates and produces the corn. The yield per acre on our uplands is not far from 20 bushels, and upon the alluvial bottoms from 30 to 40 bushels. There is no standard weight by law, but 56 lbs. is the general weight per bushel.

"*Corn blades and shucks, compared in value as food for stock.*"—I think good green corn blades, after they have taken a sweat, the best long provender ever given to quadrupeds; they prefer it to any other, and why should they not be the best judges? Corn shucks, packed away when sufficiently moist to produce a little red mildew, and sprinkled over in packing with a sack of salt to the shucks from 100 bbls. of corn, are very valuable for fodder. When used, they should pass through the cutting-box, be made wet and mixed with corn-meal or ground oats; and in this way they are but little inferior to the blades. When the latter are saved, and stacked in the field, as they usually are, I would consider the shucks quite equal to them in nutrition; upon land well prepared, 4 bushels of corn sown to the acre, and harrowed twice to cover deep enough, will make much more fodder for cattle than any meadow. The only difficulty is in curing it, as the

blades cure before the stalks, and if the latter are allowed to grow too large, they are full of sap, and require considerable time to become sufficiently cured to prevent mould. They should, therefore, be cut when about 3 feet high, drawn to the barn, and spread thin to the sun and air.

Peas are cultivated for the table, market, stock, and as a green fallow. The "mountain crowder" and "black-eyed" are the most common varieties. They yield when well saved about ten bushels to the acre; price 75 cents for common kinds—"black-eyed," which are preferred for the navy, $1 per bushel. They fatten all animals readily, and are worth about two-thirds as much as corn for that purpose. To improve the soil, they are sown broadcast upon stubble land after harvest, rolled down with a roller or harrow, and ploughed in.

Some years ago when cotton sold at a high price, it was raised to some extent in the south-eastern section of this State. But little is now raised except for family use. The low price of hemp for many years past has prevented its culture; but my economy is to buy nothing that I can make at home, and I raise hemp for my own use. I sow one bushel of seed on an acre of James River bottom land, which I have done for 36 years in succession without the application of manure of any kind; and I think the yield the present year full as good as the first year of the 36—none is grown for market east of the mountains.

Horses and Mules.—The number reported by the commissioners of the revenue last spring was 316,659—value of farm horses ranges from $60 to $75. Saddle horses, $90 to $100. Our best markets for mules and horses are Lynchburg and Richmond.

Horned Cattle.—By the last census, their number in Virginia was 1,024,148. Sheep, 1,293,772. Swine, 1,992,155. The number of each is at this time much greater. Young stock 3 years old command about $15 per head. Our markets for beef cattle are Lynchburg, Richmond, Norfolk, and the northern cities; and the fattening and driving of cattle to these markets is greatly on the increase. The Durhams, Herefords, and Ayrshires are preferred as beef cattle by the farmers in this section; while the Devons, from their beauty and quick action in the yoke, are highly esteemed as working cattle. They are also good milkers, and I think best adapted to our climate. The cost of keeping until 3 three years old, if pastured on the farm, is not far from $10; but if allowed to range upon waste mountain land, it may be estimated at $5. In neither case to be fed with grain in winter.

Hogs.—No hog designed for slaughter ought to live two winters. At 15 to 18 months old, when fattened, they weigh about 150 pounds. The consumption of a family during the year is about 200 pounds per head, with the usual supply of beef, mutton and milk. To obtain the net from the gross weight, deduct 25 pounds from the first 100 pounds, 12½ pounds from the second, &c. It is difficult to estimate the cost of production per pound, but I judge the average not far from 5 cents.

Plaster and Lime.—Clover is generally seeded upon wheat and oats, and plastered, a bushel to the acre. Its action is extremely beneficial. It is, I think, great folly not to plaster clover, as it is the life of that plant, but injurious to wheat, by forcing extra height of stalk and additional sap, which delay the ripening. Lime is also much used as a fertilizer; in the maritime counties shell lime and marl, and in Middle Virginia stone lime. I have applied between 3 and 4 thousand bushels. I commenced with 10 bushels to the acre on clover, and turned it under with a three-horse plough.

I saw no benefit, as it was without doubt buried too deep—I then fallowed in the clover, and sowed 20 bushels lime and harrowed it in; and continued my experiments, adding 10 bushels per acre until it amounted to 60 bushels to the acre. In no instance was I rewarded equal to my expectations. Indeed, the crops were little if any better than the land had produced before. I remarked that the wheat stood up better, which I attributed to the increase of silica in the outer surface of the straw. The mowers said it cut harder and they had to whet their blades oftener than before. I have composted lime in alternate layers of earth, wheat straw, and lime, in bulks of 10 feet square, and 4 feet high, hollowed a little at the top, and with many holes made by driving a stake through, to admit the air and rain, and hasten the decomposition of the straw. This compost I have applied to various crops, and always with good results. I am decidedly of opinion that it is the most beneficial way that lime can be applied.

Very few of our farmers have turned their attention to the cultivation of the vine. I have a little vineyard of one acre, containing 600 vines, and have made some wine which was considered good. I find our native grape succeeds better than the foreign. If we have a good crop next season, I will endeavor to make a more detailed report.

In my wish to comply with your request, and answer the various questions in your circular, I have written a more lengthy communication than I intended, and not entirely satisfactory to myself from the want of more correct information. Wishing success to the Patent Office, from which emanates the most valuable document published by Congress, I will respectfully remark that you have omitted the article of tobacco in your circular.

Very respectfully, your ob't servant,

CHARLES YANCEY.

Hon. Thomas Ewbank,
Comm'r of Patents.

Morrissania, Amherst County, Va., *Oct.* 10*th*, 1849.

Sir:—I will proceed to answer a few inquiries in your circular.

Wheat. Varieties, &c.—The May wheat was a great favorite of mine, some twenty years ago, in consequence of its early ripening, thereby avoiding rust; but it ceased, in time, to make a remunerating yield, and I discontinued its cultivation.

Red chaff (a bearded wheat) was next a general favorite, but this wheat was about six days later in ripening than the May wheat, and was liable to fall before it was ripe, in consequence of the weakness of its straw. It was however a productive variety, when it escaped the rust and remained standing until harvest.

The early purple straw I have cultivated for some years. The straw of this wheat is strong, not as liable to fall as those mentioned above, and it is about two days earlier than the red chaff; therefore I consider it a better variety.

Last year I sowed a part of my crop with the white flint, the yield of which was very good, but it was a few days later in ripening than the purple straw.

Enemies and Diseases.—The enemies and diseases of wheat with which we have to contend are, first in the category, *rust;* second, *fly;* third, *mildew;* and fourth, *smut.* Against the first there is no remedy, unless it be early

seeding, which subjects the crop to the ravages of the fly. Against the second our only chance is rich land, and sowing, if possible, in the month of October.

We must depend on dry, cool weather about the time of ripening for the third; and for the fourth and last, a change of seed is the only remedy I can recommend.

Soil and Manures.—A clayey soil is best adapted to wheat; such as a belt of red clayey land, resting on hornblende rock, extending through the counties of Bedford, Amherst, Nelson, and Albemarle, on the east side of the Blue Ridge.

The manures best adapted to the wheat crop will depend upon the wants of the particular soils—if alluvial, or such as are rich in humus, ammonia, &c., I consider ashes the best manure; if poor lands, such as the ridges near the *James River*, stable manure will probably supply more of the wants of the growing crop than any other; if light sands, such as are found in the tide-water region of this State, most of which have a mixture of clay, it will assuredly be the best manure.

Maize (*or Indian Corn*). *Varieties, &c.*—The variety of corn which I most esteem is the "double-eared," which has a white grain of moderate length between the *gourd-seed* and *hommony*, and is firm and heavy. It obtained the name of "double-eared" from the number of ears usually found on the stalks (two or more), which peculiarity has been effected by selecting for seed, for a series of years, the seed from stalks which had on them two or more ears, until double-eared has become a distinctive variety. This corn ripens about as early as any other, unless it be a few early kinds for table use. The early varieties are never very productive, and never planted for a crop.

I received a year or two ago a few grains of corn from the Patent Office called the Oregon, which I planted, and which proved to be the yellow gourd-seed, a variety I had known thirty years.

All kinds of grain in my opinion deteriorate, if grown on the same soil, or soils of kindred affinity, and this is the reason why all the new varieties are considered more productive. It is true that interested individuals frequently puff those they have for sale, and give exaggerated accounts of their productiveness, yet I have found by experience that a change of seed is necessary in a series of years, which always affords a more abundant yield.

The blade of corn I consider equal in value to hay of any kind; the shuck is a coarse food; it does not answer well for horses, but it is eaten freely by cows; it is of more value than wheat or oat straw, and takes a position between hay and straw.

My "experience as to feeding grain, whole or ground," is your next inquiry. It appears to me that there can be no difference of opinion as to the value of corn, ground and not ground, as food for stock; the former being entitled to a decided preference. I have the ears crushed and then ground, and believe, by feeding my stock with this cob-meal, that I save one-third.

I stated in the Patent Office Report, for 1848, that I considered the cost of the production of corn, taking ten years together, to be about 40 cents per bushel, and of wheat to be from 60 to 65 cents, and I have seen no cause to change that opinion. The usual weight of wheat with us is from 58 to 60 pounds per measured bushel; sometimes it is greater and sometimes less; that of corn from 54 to 56 pounds; the fixed weight of wheat is sixty

pounds to the bushel, and it is always sold by weight. Corn is usually sold by measure, but when by weight, 56 pounds is allowed to the bushel.

Permit me to suggest to shippers of corn to Europe to make an experiment of corn shipped in the ears. We all know that shelled corn will not keep without being kiln-dried, yet in the ears, if carefully put up, it never injures; and I am convinced that if corn were suffered to remain in the field until November, then shucked, and secured in open houses well protected from rain, it might be shipped in the ear to any part of Europe, between January and May, without sustaining any injury. The cost of freight might be an objection, but the value of the cobs as food for stock in Europe would probably be worth their freight. But be this as it may, the increased value of corn delivered free from the injury it sustains by the kiln-drying process must be sufficient to make up the deficiency.

"*Horses and Mules.*"—The "comparative value" of horses and mules for farming purposes is another subject of inquiry. I decidedly prefer the mule to the horse for farming purposes, for several reasons; 1st, because of their greater longevity—the working life of a mule may be fairly estimated at eighteen years, whereas, that of the horse cannot exceed twelve. I mean from the time each is usually put into harness, until old age puts an end to profitable labor. 2d, the mule will be kept in good condition with one-third less grain than the horse, and is not as liable to disease; 3d, he can be fed if necessary on coarser food; and lastly, at leisure times the mule will fatten in ordinary pastures, whereas the horse must, under similar circumstances, be fed.

Sheep Husbandry.—In this particular section of Virginia, not much attention is paid to sheep, yet it is as fine a climate, and they might be reared and kept as cheaply as in any part of the United States, as our winters are mild, snow seldom ever covering the ground more than a few days, and in good pastures but little feeding is necessary even in winter. They are generally of mixed breeds, and their fleeces do not generally average more than four pounds per head as taken from the sheep.

Hogs.—Our hogs are killed at from one to two years old, and weigh from one to two hundred pounds; they usually are raised in the woods, fed on corn, and consume an average quantity of about ten bushels each, to raise and fatten, therefore as their average weight is about 150 pounds, and corn at 40 cents per bushel, will make the pork cost the farmers $2 67 per hundred pounds; to which add one-third for probable casualties and necessary attention, and our pork costs us about $3 56 per hundred pounds.

Labor.—The labor on our estates is generally performed by slaves. Those who do not own slaves generally hire them. The small farms are generally worked by the farmers and their children; therefore but few white farm laborers for hire are to be found among us, and they hire at from one to two dollars per day, and board. Slaves hire generally by the year, for farm work, at from 60 to 80 dollars; and returned well clothed. To work on public improvements they hire by the year, at from 100 to 120 dollars. The cost of boarding slaves may be thus estimated for each grown person:

150 pounds bacon, at 7 cents	$10 50
12 bushels corn " 40 " . . .	4 80
2 " wheat " 85 " . . .	1 70
Sugar, molasses, vegetables, milk, fresh meat, .	5 00
1 cook for 20 hands, . . .	3 00
	$25 00

Plaster and other Fertilizers.—Plaster is freely used by many of our farmers with very happy effects, particularly on clover; indeed, to borrow an expression from one of our oldest and most successful planters (Major Yancey), "clover and plaster, like man and wife, ought never to be divorced."

Lime.—This mineral is not used extensively with us as an improver. I have tried it many years, but not with the marked benefit spoken of by agricultural writers; the straw of wheat is strengthened by its free use, although when put on farm-pen manure, well mixed, and suffered to remain two months, it benefits considerably the manure; but this practice of mine is against theory; for writers on agricultural chemistry contend that lime expels the ammonia, in its quick state, and ought never to come in contact with manure. To obviate this difficulty, I have covered the manure heaps, after the application of lime, with soil, and sprinkled them over with plaster.

Your other inquiries I will leave to be answered by persons having more information on those subjects.

Respectfully yours,

RICH'D G. MORRISS.

THOMAS EWBANK, ESQ.,
Comm'r of Patents.

HALIFAX, NORTH CAROLINA, *November*, 1849.

SIR:—In compliance with the request contained in your circular, I would offer the following report of the crops, &c., in this vicinity:—

Oats.—I have cultivated the common or branch variety, and the side or ruffled oat indifferently; the latter I think yields the best, but that advantage is counterbalanced by its greater liability to fall or lodge.

As to their value as food compared with corn, the common estimate is that they are about half that value. My own opinion is, that as a food for hogs they are worth more than half the quantity of corn; but this opinion is founded upon the idea of the hogs eating them upon the land. Oats are becoming of late years decidedly more esteemed as a crop; the reason appears to be that upon stiff clay soils oats *eaten* off the land by hogs are a good fallow crop, especially for corn.

Of the varieties mentioned above, the branching oat is the earliest.

Indian Corn.—The white and the yellow are the varieties most usually cultivated; that portion of the crop which is shipped is generally in its character determined by the demand. This grain has a strong tendency to change into the common gourd-seed or Tuscarora. Varieties from Long Island, and from New Jersey, have been tried, and have exhibited that tendency; and wherever a selected kind is cultivated, great care must be taken to keep the seed pure or it will soon lose its distinctive character. The white is generally esteemed the most valuable as a breadstuff, and I believe it is generally conceded that the yellow is better for stock, especially for hogs. As a fodder the shuck is generally preferred to the blade, but it is more difficult to save in good order than the blade. Neither the shuck nor the blades, weight for weight, can compare with good hay as a fodder.

In latitude 35°, it is believed that green corn is nearly worthless for soiling; it is too watery. I have never known it tried to any extent.

The Tuscarora corn is thought to be the variety which was found in cultivation upon the settlement of the country. It is a light grain, but very

productive by measure, the ear being very large. It is objectionable as a crop, from the very large size of the plant, which renders thick planting dangerous. It is white and yellow, and the remarks made above apply to each of those varieties. I think this grain has been advantageously hybridized with the more flinty and small-growing corn, either white or yellow according to kind, and ought thus to be improved.

I have understood that pure Tuscarora seed, carried to the latitude of 30°, becomes nearly unproductive; the plant is large, but the grain exceedingly light and chaffy.

As to the difference between whole and ground grain, in feeding cattle, it is greatly in favor of the latter: between cooked and raw, the difference is not considered as worth the expense of cooking.

The weight of the best varieties of corn may be stated at 56 pounds, but that is not common; 53 to 54 would be found more general. It is impossible to give the general average of the whole State; the best farms yield about 30 bushels of corn to the acre; the average is thought to be increased by drill husbandry and thicker planting.

Peas are cultivated extensively in North Carolina as a food for man and cattle, and especially for hogs, and also as an improver of the soil; the kind most usually grown is the red, it being preferred because of its hardy nature, as it will lie in the field and be gathered by stock hogs during the winter, and even into the spring, and will ordinarily seed the land, if desired, for the next crop. The white and other finer varieties are cultivated as food for man. I believe as a food for stock they are nearly of the value of Indian corn; they are, I think, about the same price. They are much easier in the cultivation but more laborious in the harvesting. I never gather any but for seed, and therefore cannot say anything of the product per acre. I always feed them off upon the land, and greatly prefer to let the vine rot upon the ground rather than gather it as food for stock. I have for this reason no experience as to its value, compared with other forage; but they are certainly very valuable if properly saved.

Hogs.—The average weight of hogs in this State (North Carolina), at from 12 to 15 months old, may be stated at 130 lbs. If by "average weight consumed per head," it is meant to ask how much the laboring class consume, I should answer 200 lbs. per annum of the dead hog, for the whole population, that is the hog just butchered. Raising my hogs in the pea-field—fattening them in the oat-field and the pea-field, with a regular supply of corn to them only during the months when those sources fail, it is impossible for me to give any estimate in which I should have the least confidence, of the amount they consume, or of the cost of production, especially as I think so highly of the pea as to cultivate the crop *as a fallow*, if I did nothing with it.

The ordinary estimate is, that pork raised and fattened upon corn, costs about 10 bushels to the 100 lbs., and that the net weight of a hog is four-fifths ($\frac{4}{5}$) of the live weight.

Plaster.—This fertilizer has within the last three years begun to attract notice, and I have no doubt but its use will be extended. It is found to be very beneficial in connection with clover and peas, but the mode of its operation is quite a mystery.

Lime, in the various shapes of slaked lime of commerce, and of marl, is also getting into extensive use. From my own experience, I am not able

to say anything of its advantages or the quantity in which it is most serviceable.

Yours respectfully,

THOMAS P. DEVEREUX.

Hon. Thomas Ewbank,
Commissioner of Patents.

Milledgeville, Baldwin Co., Georgia, *Oct.* 18*th*, 1849.

Dear Sir:—I have concluded to send you an account of our county, which you may dispose of in whatever way you may think proper.

Cotton is the leading article of our crops, but there will be a small amount of it raised this year. The frost in April, with the extremes of wet and dry weather, have cut the crop very short, most farmers say half; but perhaps it will not turn out quite so bad.

The *Corn crop* is very good, being rather over an average yield. The wet weather in July has caused corn to rot considerably. The average yield of corn in this section is 20 bushels to the acre on fresh land, 30 to 40 on bottom land; on old land, unmanured, 8 to 10; but there is a great deal of land cultivated which does not make five bushels of corn to the acre; though by manuring and proper culture it might be made to yield 20 or more. Farmers in this county have not yet adopted the system of manuring; some few manure their corn land, but being put in the hill and the seasons not suiting it fails, and in some instances makes less than would be made had the manure not been applied; but when the season suits it, the yield is increased three or fourfold. Our farmers must learn to cultivate less ground and to improve it, before we can profit much by farming. There are a great many farmers in this section that barely make a support, and but few that make the lawful per cent. on the capital invested.

Our land never will be improved to much extent so long as we continue to raise cotton. It is a year's business to make a full crop of cotton; and the man who makes it, has but little time to work at anything else—no time to make manure, or to haul out and spread the little that is dropped in his horse-lot; and but little time to repair fences, &c. Any cotton-making country will be a poor country.

Our *Wheat* was so injured by the frost on the 16th of April that there was hardly any made; perhaps not as much as was sown, and what was made is poor on account of being injured by the rust. Wheat is sown immediately after corn, and the fields are not unfrequently grassy, and then we have to sow late to avoid the fly. The general time of sowing is the middle of October, though it may be sown from September until Christmas. Late wheat is very apt to take the rust, but if it escapes it does well.

The kinds sown are the *big* and *little white*, the *bearded* wheat, and *Spring* wheat; each kind having its advocates. The average yield per acre is 5 bushels on common land, 10 on good land. The price usually $1, but varying from 75 cents to $1 50. The quantity of seed sown on an acre is ¾ of a bushel, varying from a half bushel to a bushel or more. It grows best on red or mulatto land.

The *Oat crop* is good where not injured by the frost; about the usual quantity sown, and a fair crop housed. The kinds sown are the *big white*, *fox-tail* and *little black;* the quantity sown per acre, from 3 pecks to a bushel; the yield 10 to 20 bushels per acre; the price 50 cts. per bushel; grows best on gray land.

Rye is very little raised in this section, except in lots for grazing and feeding to horses, green; it does not yield much to the acre, and is generally neglected. The quantity of seed sown to the acre is one peck; the yield 3 to 5 bushels; the price $1; grows high as the fence anywhere.

Barley.—The same may be said of the cultivation of barley; it is highly prized to feed to stock, green, and for grazing. The quantity sown per acre varies from 3 pecks to 3 bushels; the yield from 10 to 20 bushels; the price $1 per bushel. It is useless to sow except on *highly manured* lots.

Buckwheat is only raised by a few farmers in the county, for home consumption. We have none in our market except what is brought from the north. The quantity of seed sown on an acre is one bushel; the yield 8 to 10 bushels; the price $1.

Peas are raised by almost every farmer, among the corn, and are considered a valuable crop, though sometimes they kill a great number of hogs and cattle. This may be remedied by proper care and attention. Peas are planted in May, in the middle of the row, between the corn, and will average 3 to 5 bushels to the acre. Various kinds are planted, and they grow and do well on any soil that will sprout them.

Fruit has been almost an entire failure this year, owing to the frost. Some farms escaped the frost, and on these the fruit was good. There is not much attention paid to the raising of fruit, although apples, pears, peaches, plums, cherries, apricots, nectarines, figs and quinces all do well; some are even too careless to raise them for their own use.

Potatoes have turned out badly, owing to the dry weather in August and September. Irish potatoes almost a failure, being killed by the frost; yield per acre from 10 bushels to 100 of sweet potatoes, and about the same or more of Irish potatoes. It is a difficult matter to keep Irish potatoes through the summer, consequently we have to depend on buying our seed.

Hay is not raised at all; we use the corn blades for fodder, which is a poor substitute; the yield is about twelve or fourteen hundred pounds for 100 bushels of corn. We have some excellent grasses for hay; even the common crab-grass, which grows abundantly on every farm, would make good hay, but there is no attention paid to it in this respect.

Rice is only cultivated by a few for family use; none raised for market, though it grows well on low lands, yielding from 20 to 50 bushels per acre, with but little cultivation; worth 75 cents per bushel, rough, and 4 to 5 cts per pound, cleaned.

From the best information, it is supposed that about one-fourth or one-fifth of our land is in cultivation.

As to rotation of crops, the most common is corn first, then cotton, corn again, then wheat, oats or rye; after this, cotton, which always follows small grain.

Raising Stock.—More attention is paid to raising horses and mules than formerly, though not half enough are raised to supply the demand. Our farmers are beginning to find out that they can raise them cheaper than they can buy them. We have been in the habit of raising cotton with which to buy horses, mules, wagons, bacon, &c., but are beginning to find out that it is bad policy. We can raise as good horses and mules as can be raised anywhere, and the day is not far distant when they will be raised in sufficient numbers to supply the home demand at least.

Cows.—Not much attention paid to cattle; very few imported, though we

have some good common stock, but few that will give over one gallon at a milking.

Wages of Labor.—Farm hands average from $5 to $8 per month; mechanics from $15 to $20; slaves' hire by the year at $40 to $60 for females, and $50 to $90 for males.

Factories.—But one in our county; that one goes by steam-power; it is an extensive establishment, and is doing a good business. Capitalists have found out that money invested in factories pays a better per centage than loaned out at interest. There ought to be one in every county in the State. The South should manufacture *cotton-bagging* to pack their cotton in. One bale of cotton would make bagging for about thirty bales, which would require 65,000 bales of cotton to make the bagging and several thousand to make the rope. This would give employment to 40 or 50 factories, and hundreds of poor people would be employed to operate them, and thus the means would be furnished them of earning an honest livelihood. When will the South begin to think of these things?

Agricultural Societies.—We have none in our county; several attempts have been made, but have failed.

I have procured some genuine Havana tobacco-seed from a gentleman in Mississippi, which I intend planting next year, and if I have luck with them, I will supply those who want to raise it. The gentleman from whom I obtained the seed, sells his cigars at $20 per thousand. He makes about $200 from one-fourth of an acre. Here is a chance for any man who will take the pains, to make a great deal from a small piece of ground; and he may extend his operations as much as he chooses. The labors of the farm at the South are not sufficiently diversified. They are too much confined to the single article—cotton. We depend too much on raising it to buy everything else with, and what is worse, to buy those things which can be produced here cheaper than cotton. The South should raise wool largely. Every farmer should have his flock of sheep, from which his cloth should be manufactured by his own family, which would save many dollars paid out annually for inferior cloth. Everything which can be raised or made *at home* should be done. Besides, we have vast quantities of uncultivated land, which is as good for sheep-range as any in the world. Thousands of sheep might be grown annually with little or no expense or trouble. Nothing which a man can buy will pay him greater interest than a flock of sheep.

Every farmer should raise his own bacon. Perhaps one year in ten, a man may see the time that he could buy it cheaper than he could raise it, but this will not do for a man who intends to live by farming. The same may be said in regard to horses, mules, &c.

Mills.—Flouring mills should be built; this would cause a great increase in the cultivation of wheat, which is at this time too much neglected. If such mills were erected, many would raise wheat instead of cotton, which no doubt would be as profitable. One or two would do a good business in our county.

If cotton could again become a profitable crop, and farmers could be induced to raise a *little*, improve their lands and keep up their fertility, we might yet prosper and get paid for our labor; otherwise we will keep our land poor, be poor ourselves, and leave our children poor; or, we must pull up stakes and move to where the soil is inexhaustible. It is the successive crops of cotton which have been grown on our lands that have so exhausted them. We must now rest and manure them before we can farm profitably

upon them, or they will cause us to be as bare of property as we have caused them to be of soil.

Yours respectfully, &c.,

WILLIAM C. DICKSON.

Hon. Thos. Ewbank,
Com'r of Patents.

Quincy, Gadsden Co., Fla., *Nov. 9th*, 1849.

Sir:—I have delayed my communication longer than I intended, hoping to be able to give you a table of the exports of cotton and tobacco.

From the best information I can obtain, the tobacco of this (Gadsden) county will produce about $200,000. This is one of the best portions of the State for the article. I now make a few additional remarks upon *Maize.* I cultivate four varieties, the *large-eared white*, the *yellow*, a *flint* (which I use for large and small hommony), and the large *North-River*, which I obtained of Grant Thorburn of New York.

I have put up a few ears as samples for you which I send by mail. I find the red-cob corn matures best. The North-River is an early corn, but yields per acre about one-fourth less than the white or yellow.

I have for 30 years steeped my seed-corn in nitre brine, a pound of nitre and eight ounces of copperas to the bushel of seed-corn, the grain to remain in steep from 48 to 60 hours before planting.

My rule in selecting seed-corn is to ride myself into the field accompanied by two hands with bags, seeing that they select only from stalks bearing two good ears, and of these the largest is gathered. My seed corn is then put away in a new crib erected on high wood posts four feet above the ground, leaving one and a half inches between the weather-boarding and cover. This crib is located about 100 yards from my corn-house. When housing my corn, I lop a china-tree and throw a quantity of berries, leaves and all, into the house with each load of corn. After the experience of a number of years, I find this to be a good preventive of weevil; and since I adopted the plan, my house has never been infested with rats.

As to rain, I keep regular tables daily, and if you wish and only signify the same to me, I will make you out a table for one or more years and forward it by mail.

Our seasons are irregular; some springs dry and a wet summer, and same as to winter. We have our coldest weather in February. The lowest I have ever known the mercury (Fahr.) was 14°, and the highest 48°; this is but rare. Our usual warmest weather is 92°—we have fine breezes, and our nights are generally pleasant. I have no barometer. I would state that my time of planting corn is from the last of February to the middle of April—fodder we gather in July and August—house corn in September and October. I expect to sow some of the bearded wheat in two weeks. I shall try an experiment next year with a new variety of corn from Alabama, it is said to yield well—about 40 bushels per acre; from 3 to 5 ears on a stalk.

Respectfully yours,

DAVID L. WHITE.

Hon. Thomas Ewbank,
Commissioner of Patents.

Barbour Co., Ala., *November 5th*, 1849.

Sir:—A circular from your department has been forwarded by the Postmaster at Clayton, requesting information as to the agricultural interest of this section of the country. We must admit that to give anything like an accurate account is impossible, as we must be governed by our own judgment, and that of others we have consulted, having no accurate data upon which to base precise estimates.

Maize, or Indian Corn.—The yellow corn is most esteemed by planters, owing to its sound grain, not being so liable as the white corn to rot in the field, or so subject to the ravages of the weevil, which of late has been very destructive to the corn. It has been housed in the shuck, and in one or two instances salt water was sprinkled on each load as a protection, but with no beneficial results. Even the new corn in the field is infested with this insect. Corn is planted in March and ripens in September; very little use is made of the shuck, except in wintering cattle. As regards its value compared with blades, there can be no doubt, but that if properly prepared it would make a valuable food for horses, mules and cattle; and for milch cows, by adding bran, it answers admirably. Blades with us are not properly managed; hence much of their strength as food is lost. Instead of being housed as soon as cut, they are suffered to remain stacked in the fields, exposed to the sun and rain, which rot the end of the blades at least one-fifth. This is not only a clear loss, but becomes injurious food to the animal. As regards its value compared with hay, we are unable to say, as no hay is ever used in this section of country. In cotton-growing countries we are very deficient in preparing forage, and in making an economical use of it when prepared. The grain, when coarsely ground, is far preferable to feeding whole, as it is less liable to produce colic; far more nutritious, and a saving of at least one-eighth. When cracked and mixed with oats or rye, it is still more valuable; less heating to the animal when hard worked, and less dangerous than corn alone. I have seen horses fed entirely on cracked corn and oats moistened with salted water, which were very fat and sleek, although they were worked constantly and very hard. In fattening hogs, ground corn scalded, and mixed with bran, pumpkins, turnips, potatoes or slops, will fatten in half the time, and require but one-eighth of the corn. Too much cannot be said in favor of grinding corn for stock of all kinds; and on all well-regulated plantations, mills should be erected, if to go by horse-power, for such purposes. None except those who have tried it can estimate the saving and advantage of grinding corn for all feeding purposes.

Peas are planted more for stock pastures than for a fertilizer. But with some they are becoming unpopular, owing to the opinion that they kill stock; and the ground-pea or ground-nut is being substituted in its place. So far as my own experience goes, I have lost horses and cows by over-eating in the pea field; but never have found them so fatal to hogs, as they have been reported by others. As a fertilizer, no experiments have been made by sowing down and turning in with a plough when in its luxuriant state of sap. But when sown thick, and as I have done, sown broadcast among the growing corn, it answers a fourfold purpose; 1st, it soon shades the land from the influences of the hot sun; 2d, it keeps it from washing by rains; 3d, it affords pasturage; 4th, the great litter left by the vine and leaf is finally turned under as a fertilizer. I have found this system well adapted to the purposes just described, and exceedingly beneficial to the land. Some

planters gather the vine with the pea on it, and stack it for forage; it makes excellent winter food for cattle, but robs the land of a vast amount of litter for manuring purposes. I consider the pea crop too valuable to abandon on account of its deleterious effects on hogs; and I think more hogs have died *for the want of them* than from eating them.

Cotton.—This is the all-absorbing product of this section of the country. At so early a day, it would be impossible to say what will be the average product of the State, or even of the county per acre, or per hand, as solicited in your circular. The crop has encountered a series of disasters from first to last. The late frost in April killing the first planting; the excessive rains in May, June and July, and a sudden and severe drouth in August, all injuriously affected the crop. However, a very large crop was planted, and after the frost replanted, and it is now safely estimated from inquiries in all quarters that the crop will not fall short of 2,000,000 bales. There have been some new varieties of seed introduced in this section, the *banana* and the *sugar-loaf*. The first has been tested on a *small scale*, but with the most satisfactory results. Its yield was over 3,000 lbs. per acre. But these small-patch experiments will not always do to rely on, as in general culture a large patch is neither prepared nor cultivated so well. Hence the regular field system must be adopted to test the value of any new seeds. The *sugar-loaf*, sent here by Dr. M. W. Philips, was tried in the regular field system, under ordinary management, and the result was most satisfactory. It produced 1200 lbs. per acre; an average of 400 lbs. more than the *Petit-gulf*, and under the very same management. The process of cotton culture has altered in no way to my knowledge from what it has been for the past six or eight years.

Respectfully yours,
JNO. H. DENT.

Log Hall, Edwards, Miss., *Nov.* 1*st*, 1849.

Sir:—I have postponed a reply to your circular of July 1849, for various reasons, but more especially that I might give you, and through you our fellow-citizens, as accurate knowledge as it be possible for a man living in the country to give.

I must begin by thanking you for the distinguished consideration you are pleased to mete unto me. I feel it no small matter to be selected by your department as one who has some competency in being useful, and I assure you, I trust ever to be found prompt to add my mite to the sum of human knowledge.

Permit me to take up your circular in the order in which you propose subjects for inquiry, and to give such remarks as I trust will be acceptable to many readers.

Wheat.—I have grown wheat only one year. I found upon the richer low lands upon my place that the straw was longer and stood up well, heads larger, but it rusted before filling; upon clay land, I made 10 to 12 bushels per acre. I knew, a few years since, a Mr. McLaurin, of Sampson Co., to have wheat that averaged 62 lbs. I think, and he assured me he had made 40 bushels per acre—pine land and cow-penned. Mr. McL. was a highly respectable gentleman, a most noble host, generous to a fault, if it could be, in entertaining friends and strangers. He declared that Mississippi was a better wheat country than North Carolina, and that he had not had an

entire failure, nor but one partial, in 25 years, I think; whereas, in North Carolina, he had had failures every four years.

Oats.—This crop is sown pretty largely; I have seen more than 200 acres on one plantation. We sow all sorts, ruffled, white, black, and the Egyptian—this is a white oat and weighs 42 lbs. This latter is generally preferred in middle and South Mississippi. We sow them in October or November, or even in December or January. They will stand any cold here, and furnish excellent food for hogs all winter. We feed them to horses, cattle and sheep, but they will not do more than keep horses and cows from starving. Some folks regard them as a good pasture, but I do not; and I think the advantages are, saving of labor in the spring, and their being fit for feeding earlier than spring oats, and yield, I think, better than any I have tried, except the potato oat of England. Oats for feeding are cut by the 3d of June, seed oats on the 11th. Mississippi has not had due credit in the statistics of the U. S. as to her oat crops. We consume more food here, man and beast, than any other population upon earth, except in similar latitudes with a similar population and similar pursuits. More grain is wasted in such a country than feeds an equal population in some places.

Rye.—This grain is but little cultivated, and only as a winter grass, I might say. I have ploughed in, as a green manure in March and April, 50 to 100 acres in one year; and it requires no ploughing when sown upon cane or cotton land; it is a great advantage in preventing the washing of land from our winter deluges, as also a vast green crop to turn under, and gives an excellent winter pasture.

I will remark here that Egyptian oats will yield about as much when sown on cane or cotton land, in October or November, as if the land had been ploughed; I prefer to sow both these grains without ploughing in, and I have tested the matter effectually.

Barley.—I never saw it growing in Mississippi.

Maize.—I prefer a grain intermediate between flint and gourd-seed. I think there is more shuck than with the former, and not so much injured by the weevil; it is heavier than the latter, and where the selection is made from medium stalks, it bears closer planting, and yields better than either, weight and measure included.

Flint corn is more destroyed by weevil than any I ever planted. But little pure flint is grown. The gourd-seed is thought to produce more, but I deem it light and too chaffy. The flint and gourd-seed both ripen later than the variety I plant, and both have larger stalks. With some the flint (or probably it may be called the ⅔ds flint, as it is not pure) yields best. I plant a variety of corn we call flint, for bread, which has been grown by the same planter for nearly 40 years; he says it is the same as when he began. I have seen remarks about change, but being an experimenter for these 18 to 20 years, I have seen none of it. Without ordinary care, it will deteriorate, I believe, but no more can I admit.

I use the shuck passed through Sinclair's straw-cutter for feeding mules, mixed with fodder and oats. I regard it as equal to fodder; and when the mules are taught to eat it, the shuck is healthier and stronger food. I prefer good hay to either. I have used the corn cut when in roasting ear for stock, and some broadcast, but not for soiling. I have now several tons of the latter housed for winter feed.

I have used corn ground and whole for horses, mules, cattle and hogs,

and think there is a saving of full one-fourth; if cooked for hogs, the saving is full one-third.

The crop in Mississippi, so far as I have information, is shorter than for years—and, as we have learned in the last few years, to use it lavishly the deficiency will be such as to make it high all next year.*

Hay, properly speaking, is but little used. We rely on corn blades. There is much crab-grass hay and pea-vines put up for winter feed. And I am very sure we make more provender for horses and cattle than we have ever had due credit for.

Cotton.—"*Vick's* 100 *Seed*" is as good now as the first year after given to the public; it was never vaunted to be other than a patient close selection of the Mexican or Petit Gulf. Col. H. W. Vick has done more in his constant perseverance in this selection than any other man in our country. There have been many varieties that lived just long enough to humbug those who had any enterprise, and then died off. There are many planters who deem themselves too smart to be humbugged; and there are many others of a race too smart to believe anything, except that dimes give character and sense. These people do themselves an injury, and they injure the cause of improvement. I acknowledge that Mastodon and Otra cottons were humbugs; because many created a false impression when they knew there was not a corresponding value, they would have sold seed at $10 per bushel, though they knew the seed would be planted only as long as the product was unknown. But, admit all this humbuggery, and that the U. S. lost $100,000 by it, and a few men pocketed the same—yet, there has been and will be improvements that will enhance the value of cotton estates millions of dollars, and much of this I attribute to the patient perseverance of Col. Vick.

Brown seed stands next in the estimation of planters; these seed you distributed last year. Some planters consider this the best, but I give my own opinion, leaving others to state theirs. I deem this to be identical with the Tarver seed of Alabama, and the same which Dr. N. B. Cloud planted with such remarkable results.—I have planted the Brown seed two years, and am convinced the sugar-loaf is *here* the most prolific and the earliest. I have used seed each year from different sources, and will try them another year.

Pitts' Prolific is also much praised. Here the bolls are small and not easy to pick. I do not think of continuing the variety.

Hogan's.—Although not as good as last year, yet I will continue the variety. Some stalks are remarkably prolific—bolls large; from these I have selected; too many stalks are common, showing the big prices to have caused the sale of all the seed.

Banana (of Warren Co., Miss.) is *identical* with the above. *I know it.*

Prout is the same seed, and the parent of the above.

Cluster, the original seed procured by Mr. Prout, from Georgia, as he informed me.

Pomegranate, ushered to the world by General Mitchell, of Miss., with such great flourishes of pen and type, I have reason to believe is the same seed. I only know it from description. This tallies with the above, and Mr.

* I do not know that the weight is established by law for any of the grains. The improvement in culture has shown an improved per acre crop, especially of corn. What the average is would be difficult to say; yet I think that, for good ordinary years, maize may be estimated at 25 bushels. Of small grain we never note.

Hogan informs me that Gen. M. bought a pint of seed of him 2 or 3 years ago.

Multiflora, a new variety. The producer claims some 40 pecks of increase of lint. The production is large. I will plant an acre next year. Only had about 100 seed this year.

Mammoth, a few stalks only in culture; bolls very large, and not having yet picked a boll, I can only say it stays in the boll well, and is productive enough to induce further trial. A part of a crop might be planted and kept for late gathering, this Nov. 15th, 1849.

Manures.—I have only used stable and cow-lot manures, and cotton seed. I cannot say which is best. Enough of either will suit Mississippi, for a long time yet to come. There is no change in culture for several years at least, and the process I described in the American Agriculturist is getting into more general practice.

Orchards.—The interest on this subject is greatly on the increase; many planters are putting out the choicest fruits for home consumption. I could easily give you many sheets upon this branch of rural economy, but so much has been written on the subject, and so well, that I must refer your readers elsewhere. I deem it however right to say that, in my opinion, Northern fruits can be successfully cultivated here.

With great respect, I am

Sincerely yours,

M. W. PHILIPS.

Hon. Thos. Ewbank,
Com'r of Patents.

Washington, Miss., 15*th November*, 1849.

Dear Sir:—I have often tried to draw up a series of answers to the queries from the Patent Office; but could state so little that was satisfactory, had so few *facts* as a basis, that I gave up the attempt. I shall try it again, however; and have placed the extra circulars sent to me in the hands of those I thought might possibly fill them up, but fear few will do so.

Cannot the several States be induced to require of the tax assessors of each county to fill up a series of condensed points and queries, to be put to each planter assessed? I know of no other way in which you can procure the statistical facts you require with any degree of correctness.

A second edition has been published of the "Plantation Record and Account Books," which I prepared for publication at the request of a publisher in New Orleans. They have come into very general use, and will in a few years afford a mass of the most valuable information, of the very nature required. You will receive herewith a copy of each number for different sized plantations, with the hope that you will give me the benefit of the experience of your office in suggestions for the improvement of the next edition; that the work may be made the means, if possible, of preserving a still greater amount of that information of so much importance to the country. But to the several questions in the circular before me.

Wheat.—There is but little grown in this district. In the adjoining county of Jefferson, good crops have been grown, with occasional discouraging failures from long drouths. There is no doubt but wheat can be grown profitably, but not until the wants of the soil are considered and supplied.

Oats.—Singular as it may appear, this, looked upon as altogether a northern grain, succeeds well here. I have imported many varieties from Scotland and France, and have grown them successfully; but have found none of them to compare with the variety known as the *Egptian* or *winter* oat. It has been in the South many years, perhaps fifty, and is *thoroughly acclimated*. Of the importance of acclimation, more anon. I have repeatedly found this grain to weigh 42 lbs. per bushel. The grain is white, large and plump. It is sown in September and October, and even later; ripe during May, according to the season and soil—with me, during the first and second weeks. Affords excellent winter pasture. By planters and overseers generally, the oat is considered to be very inferior to corn as food for mules and horses, during hard work. The cultivation of the oat does not extend much, arising, it is to be feared, from an indifference to improvement or change, and from the trouble attending the cutting and threshing. This variety, the Egyptian, is invaluable, not only as a fodder crop, but for winter pasturage and as an auxiliary in improving the land.

It is advantageously sowed amongst the cotton, after the first or second time it is picked over, or amongst late corn; the sweep or cultivator being used to cover. During the winter the stalks are beat down as usual, not at all interfering with the cutting of the oats. If intended for the improvement of the land, hogs or other stock should be turned in when the grain begins to change color, and when they have eaten it pretty clean, plough the stubble under and sow cow-peas; these to be fed *off*, in turn, to be followed by oats again or clover.

Rye.—I have grown the *Multicole* and the St. Johns-day rye, or "*Seigle de St. Jean*," imported from England and France; neither of these were superior to the common "up country" rye; unacclimated, this last, after being grown here some three or four or more years, yields fair crops, and is sown to a small extent for bread; although otherwise valued by some, is inferior to the true Egyptian oats for winter pasture, or fodder. If desired, you can have a supply of these oats next summer for distribution from your office.

Barley.—Am not aware that it is grown. Have tried some half dozen sorts, as also *bear* or *big*, imported from Scotland, not worth the trouble and expense.

Maize.—Many varieties are grown, principally those known as flint and bastard flint. The gourd-seed varieties are very objectionable in this climate; principally on account of their softness rendering them unfit for bread, and open to the attacks of insects in the field and the crib. We require a grain *white*, *hard*, and rather flinty—*white* because of its great consumption in bread and hommony; in the preparation of both of which our cooks greatly excel. When meal is ground for bread, the mill is set rather wide, that the flinty part of the grain may not be cut up too fine, this being sifted out for "small hommony;" the farinaceous part of the grain is left for bread. This hommony is a beautiful and delicious dish. On most plantations the negroes have it for supper, with molasses or butter-milk. A *hard flinty* grain is necessary to head the weevil, with which not only the cribs but the heads of corn in the field are infested. These are the *Calandra oryzæ*, the true rice weevil; distinguished from his European cousin by the two reddish spots on each wing-cover, and known among us as the "black weevil;" also a little brown insect, not a true weevil, but a *sylvanus*, as Dr. Harris writes me, to whom, through his invaluable work and private correspondence, I am indebted for much of that little I know of the

insects injurious to agriculture. This sylvanus and another of the same genus, most probably the *S. surinamensis*, affect the corn in the field before it becomes hard, causing serious damage—but nothing to equal that occasioned by the black weevil.

I know of no generally successful method of staying or even checking the injury caused by the insects; though much might be written in the way of suggestion.

Almost any variety of this grain planted even as late as the 10th of July, will ripen in our fine climate. There is thus no difficulty, where the land will bear it, of ripening two crops of corn on the same ground in one season.

As to the change of character and qualities from change of climate, I will speak anon.

I consider the shuck to be richer and stronger food than the blade, which is but chaffy at best, when gathered from stalks which have matured grain, and is moreover the most costly article of fodder that is fed in any country. It costs some 8 or 10 per cent. of the grain, in weight and value, by being stripped before the grain is ripe. It costs no trifle from the injury the cotton crop sustains, from being deprived of a thorough working, at a stage when such a working is of great importance to that crop, by the necessity for fodder pulling at that very time. And the cost of pulling is great indeed, inasmuch as that a hand cannot pull, bundle and stack more than 3 to 400 lbs. per day; during which his health suffers more than at any other work; still, it is doubtful if the dependence upon blade fodder in the South be ever greatly lessened.

I suppose blades to be equal, pound for pound, to timothy hay as received here in bales, superior to crab-grass hay (*Digitaria sanguinalis*); all three inferior to sound shucks; and none of these at all to be compared with hay of Bermuda grass (*cynodon dactylon*), the most productive and nutritious grass in hay or pasture of which I have any knowledge.

Of green corn, grown in drills, for stock of all kinds but hogs, and especially for cows and work oxen, it is difficult to estimate the value. I grow acres of it sowed in succession through the spring and summer, curing for winter fodder all that is not consumed when the ears begin to form. It seems wonderful how it can be dispensed with.

Where the work is done by plantation negroes, it is generally best to feed corn in the ear. Grinding and cooking are unquestionably economical practices; but difficult to be kept up with frequent changes of administration, under different overseers, where the planter is not always on the spot.

Rice.—I have grown, and some of my neighbors still grow, common upland rice with the most perfect success, gathering the heaviest crops known of any small grain; unless perhaps oats occasionally in Scotland. Grown in broad drills, say three or four feet apart, and tended with hoe and cultivator, requiring two good workings, nothing is wanting but some degree of encouragement, and the spreading of proper information, especially in the pine-woods regions, to make this a staple and a profitable crop. On the small pine-woods farms in the interior of the State and along our sea coast, upland rice is grown in considerable quantity and of fine quality; but for the want of mills or a market for the rough rice or *paddy* it is fed mainly to stock. I forwarded a sample to Liverpool recently to learn its value as

paddy, and have no doubt that it will bear shipping with profit.* Such inquiries should be the duty of a general and state boards of agriculture. The tax upon the time and pocket of those individuals desirous of procuring and disseminating such information, and of introducing, testing and acclimating new trees and plants is too great, and should be borne by the general government.

The pine-woods farmers speak of their sandy lands, usually considered of little value, being capable of producing some three fair crops of corn, and four or five of rice, with an occasional crop of sweet potatoes, before they are utterly *worn out.* They also say, that if the straw be returned to the land it will produce many successive crops of rice. Manuring, except to a limited extent by cow penning, is never practiced.

In answer to your *note*, it would be the merest guess-work, equal to guessing at the growing cotton crop at 1st of September, to state the "cost of production," the "average per acre," or the actual aggregate product of our State; and therefore I will not attempt it.

Of the "usual weight"—I had a good, sound common-sized flour barrel filled three times, settling the corn each time when filled, by shaking the barrel moderately, from the pile of corn (bastard flint, similar to the well-known Baden), as hauled and quite closely slip-shucked in gathering. When shucked and shelled, and the shelled grain poured into the barrel, it lacked four inches of being full, which I estimated at half a bushel.

The shelled corn weighed, net, 173 lbs. Add shattered and shelled off, where unsound at the points, 2—175 lbs., or $3\frac{1}{8}$ bushels of 56 lbs., our legal weight. The corn measured, in a sealed half bushel, $3\frac{1}{8}$ bushels. The corn was sound and good, with a moderate proportion of nubbins. It is to be inferred from this that a barrel of corn must be closely slip-shucked to average, to a certainty, a bushel of shelled corn; and our southern white

* The house to whom I forwarded it, Messrs. E. Zwilchenbart & Co., write to this effect: "We submitted the samples of paddy rice enclosed therein to our brokers of the article, who report that it differs considerably from what they have usually seen imported from Charleston; it appearing to be more of the Java description, being short and plump in the grain. As the consumption in this country runs entirely upon the Carolina and Bengal kinds, your sample cannot be *accurately* valued; but from comparison with the Java and Brazil paddy, which has occasionally been sold here, we should consider the present value to be 3s. per bushel, which, presuming the bushel to weigh about 44 lbs. would give 7s. 6d. per cwt. The imports of paddy from Charleston and Savannah are always in bulk, but if great care be not bestowed upon its condition when shipped, and also upon the stowage, it is liable to become heated, whereby the color of the rice and consequently the value of the paddy is affected. This fact renders its value on arrival always more or less uncertain, and an allowance on this account should in every case be made.

"Freight from America to this country is at present exceedingly low, and from the manifestation of the U. S. Government to reciprocate our late free trade movement in the abolition of our navigation laws, we think there is every likelihood of its continuing so. From last advices, the freight of flour from N. Orleans was 3s, per barrel, which will give you an idea so far to make your calculations. Delivery charges may vary; viz., when the stuff is sold from the quay or ex-ships, or if it has been warehoused. In the latter case, of course, they become higher. If sold ex-ships, they would range about one penny per bushel; going into warehouse, the cartage, &c., require to be added. Perhaps the best plan to test the value of the article would be to ship a dozen or twenty hhds. on trial, the outcome of which would be a guide for the future. We will be glad to take charge of any quantity you may feel inclined to send in this way, and to draw the best possible result therefrom."

In the absence of such means of procuring information of the foregoing character, I have found the excellent house named above at all times ready to answer inquiries promptly and liberally.

corn, from which the blades have been stripped whilst yet green, will weigh, if sound, exactly the legal weight of 56 lbs. per bushel. All grains are bought and sold in the loosest possible manner, all through the South-west, unless in New Orleans.

Hay.—With the exception of crab grass, pulled by hand from amongst the corn, where it comes up thickly after that crop is *laid by*, there is but little hay made. There are some small meadows of Bermuda grass about this neighborhood, from which the most extraordinary cuts of hay are annually taken.

There is no business whatever of an agricultural character that could equal in the results extensive meadows of this grass, on the Mississippi bottoms, producing hay for the New Orleans market.

The land being level, mowing machines might be used; more readily as the surface of a Bermuda meadow must be made very smooth before it can be cut to any advantage, even with the scythe. Hay, in New Orleans, is rarely so low as fifteen dollars, and is frequently up to $30 and even $40 per ton. Being on the river bank, the market could be watched and supplied when prices were highest, and there would be little or no expense of hauling. Land now rendered almost worthless by the bitter coco (cyperus), may be applied to this purpose, as the Bermuda will overcome the coco, by top-dressing and mowing. I repeat (see Southern Agricultural Almanac for 1848, page 61), and can refer to numerous witnesses to prove, if needful, that we have measured the ground and weighed the well-cured hay, and this more than once, when *one cutting*, and that *the second one that season*, yielded over *five tons per acre*. After that, a very fair *third cut* was taken from the same ground. *Five tons per annum* is a moderate yield from a good, well-set Bermuda meadow, which is either top-dressed with sludge from an overflow or receives one of manure annually.

It affords equally valuable pasturage; but is a pest in the crop, only to be destroyed by a smothering crop of corn and pumpkins, clover or peas. By this means, I find no difficulty in *checking* and even eradicating it.

We have reports of hay made from *leersia orysoides*—"Rice's cousin," as the negroes call it, and a valuable grass here, though pronounced by Dr. Darlington "worthless." From *Eleusine Indica*, or dogs-tail grass, "crow's foot," of this region, which on manured land grows with great vigor, though an annual grass. From Nimble Will (*Muhlenbergia diffusa*), which also, in some soils, and especially in wood land, originally of *Magnolia grandiflora* growth, but from which the magnolias have been cut, leaving only the deciduous trees, makes excellent pasture. And in wettish flat lands, from several varieties of *Panicum crus-galli*, which there grow vigorously, not unfrequently mixed with *cyperus repens*, sweet coco, or nut grass. And some speak of hay from Guinea grass (*Tripsacum dactyloides*), which certainly grows vigorously, affording frequent cuttings, and objectionable only thus far, that in no condition or stage of growth can ever mules be induced to eat it freely; at least such is my experience.

I am not aware to what extent experiments have been tried with other grasses. I have imported from Europe seeds of over forty kinds, from Texas and the far West over ten or a dozen, and have also tried any number of native (?) grasses with varied success, of which the relation might be of some interest; but will only remark here, that after careful and repeated trials, I have found no grass to compare, for hay or pasture, with the one commended above—Bermuda grass, the Doub or Dub, the sacred grass of the Hindoos.

Of its value for summer grazing, I must state further that it far exceeds that of any other grass within my knowledge in abundant yield, in sweetness and in nutritive qualities. On the common around this village, there are cattle, horses, mules, sheep, goats, hogs and geese innumerable, all the year round, from the first evidence of renewed vegetation in the spring; and yet they are not all able to keep down this grass which covers the common; and during the summer, when it flourishes most, much of the stock is in fair order.

Of Clover (*see Plaster*, &c.)—It may be well to add that late in the fall, when the cotton is stripped of its foliage, the fields become green, where the soil is at all good, with various annual grasses and nutritive plants, which afford sweet pickings to stock, and especially sheep, all winter. There are the "winter-grass" of this region, the nearly universal *Poa annua*, here at times almost rank in its growth, reaching a height of from four to eight inches. Chick-weed (*stellaria media*), of which cows are very fond, as also sheep, covering the hill lands where rich with quite a heavy growth. *Phalaris Americana*, a beautiful southern grass depicted in Cellist's work. *Hordeum pusillum* of Nutt, a dwarf barley, or, as here called, "Texan Rye," forming sweet grazing before the blossom drops. *Alopicurus geniculatus*, floating fox-tail of the English, almost as valuable as the winter-grass. *Trichodium laxiflorum*, hair-grass, also springs up. These are nearly all annual *winter* and *early spring* grasses. In the fence corners may be found a good bite of Nimble Will, and on poor spots of fox-tail. Within the last few years, a creeping grass, somewhat in its habits like the Bermuda, has spread to a considerable extent over the open pastures. It is known by some as "Cuba-grass," and is a *paspalum* or *digitaria*, I know not which; the sheep find sweet picking from it. On the sea-coast, about Pass-Christian and Pascagoula, I find a close good sod of another grass, of similar habit to the last named, of which I have not been able to determine the name. It makes a very pretty pasture, and grows well even in a partial shade. Old pastures become infested with a coarse grass, growing in tufts, known as "Natchez grass," *agrostis Indica*, or black seed-grass. I think it of little value; in fact a filthy pest.

Such is an imperfect sketch of the grasses most common and useful in this portion of the south. It is a branch of botanical knowledge the most difficult to acquire, and assuredly sufficiently neglected. Would that the directors of the Smithsonian Institute might be induced to turn their attention to the subject, and give to the world a work upon the Graminæ of this continent, native and introduced, worthy of the subject. If there is no hope of this, cannot your department take up the matter? There is no one topic of so much importance to the agricultural community. We have been again and again promised a work of the kind, but as yet nothing has appeared. Each and every grass should be depicted, and that in the very best style of the art.

I have said nothing of a grass frequently spoken of lately, "the Muskeete" or more properly "Mesquit" grass, and for the reason that, though I have received, after much trouble and expense, various lots of "Muskeete grass-seed," comprising five distinct varieties, only one of them is of any value; and that I cannot name as yet, but will be glad to send dried specimens of this and all the other grasses to be found in this region, to two or more botanists, who can assure me that they have made this depart-

ment their particular study, and who will aid me in identifying and describing them.

I am not aware that *irrigation* of meadows has been practiced.

Peas.—No varieties of the genus *Pisum* are grown, except in gardens. But the pea, or more properly bean, known as the "cow" or "Carolina" pea, is grown to a great extent, as food for man and beast, and for the improvement of the land. In all that has been written upon this very valuable plant, second only in value to maize in these Southern States, in no instance can I find any reference to its origin or botanic name. Having examined all the authorities within my reach, and caused many extensive libraries to be searched, and inquiries to be made in Europe, I have come to the conclusion that in any or all of its numberless varieties, it is hitherto undescribed, or described very imperfectly, and am therefore unable to answer the inquiry so often put, of "What *is* this cow-pea?" I am not competent to a botanic description; but will have pleasure in communicating the information acquired, and in forwarding seeds and dried specimens to botanists who are competent. It is evidently a *dolichos;* but if described at all, is most probably classed as a *phaseolus.* There are many *species* as well as *varieties* cultivated under the general name of *cow-pea;* ranging in size from that of a grain of wheat, to that of the smaller varieties of snap-beans. In color they vary still more; snow-white; white with black, red or yellow eyes; jet-black; purplish-red; yellow; speckled, like the early valentine bean; greenish-gray, like the gray field pea (*pisum*) of England, &c. Some grow very vigorously, covering the corn stalks, when planted among that crop, with a perfect load of vine and leaf; whilst others scarcely vine at all. The blossoms are of different colors and sizes in the several kinds; and the pods are some flat and some round; in some the pods stand out stiffly, in others hang loose; but all the kinds bear a strong family likeness.

The cow-pea is most commonly planted between the hills of corn, at the second hoeing. It does not vine much, nor bear pods until after the fodder is pulled; it then covers the stalk, ear and all, with a mass of foliage; affording, undoubtedly, a very large amount of food for stock, which are turned into the field after the corn is gathered, and vegetable matter to be returned to the soil. But the injury to the soundness and keeping quality of the corn, and the multiplication of weevil under the shuck from the shelter and moisture and soft condition of the grain—all of which weevil we carefully gather with the corn, and house with it in the crib—it is to be feared greatly counterbalance the advantages. Stock, too, are very frequently injured and in many cases killed by being turned into the corn-field to feed upon the peas. Many of the peas have sprouted or moulded, and not a few are in a state of partial decay before this can be done; hungry cattle and hogs are not very discriminating; hence the injury. Our southern agricultural papers contain many lengthy articles, pro and con. Although it is certain that great and sudden mortality has occurred among cattle and hogs, and occasionally even mules and horses, after having been some days in the pea-field, it is equally certain that a great majority of careful planters have been in the constant habit of consuming their peas in this way for many years without any such results.

It is, however, as a fodder-crop and as an improver of the land that this plant is of the greatest value to the south. Land, when "turned out," that is, when so far exhausted by repeated croppings and ceaseless cultivation

as to be no longer capable of yielding a remunerating crop—is generally so much worn out as to be unable to produce a crop of even weeds to afford protection from the sun. Even the cow-pea will not make a cover, unaided. Manuring, unless in some simple and easy way, will not soon be practiced, even to the extent to induce a growth of pea-vine. A cheap and easily applied manure for this purpose, I have found to exist in marl and in plaster (sulphate of lime) and of which I shall speak under that head.

I can give but little idea of how many bushels of this pea is produced per acre; most probably, when grown amongst the corn, from ten to twenty. They have to be picked by hand, pod by pod; each pod contains from 18 to 22 peas. They sell at $1 per bushel.

Root Crops.—The Irish potato is grown to some extent, almost entirely for home consumption; unless near the rivers, where pretty large crops are occasionally grown for the New Orleans market. They produce well, and are large and mealy. Can give no particulars as to cost of production, &c.

The turnip is also grown in considerable quantity for plantation use; rarely for stock or for sale, though yielding large returns for the labor requisite.

Carrots, beets, mangold-wurtzel, &c., only in gardens. The artichoke I have grown to some extent, but do not value it highly.

Skirving's improved Swedish turnip (Ruta-baga) I have found a very valuable root, productive and highly nutritious; and continue to grow them.

Maranta arundinacea, which yields the arrowroot of commerce, I have tried so far as to prove that it may be made a profitable crop.

The "Pindar" (ground-nut) is grown for market by the cultivator of sandy pine lands, and generally by the negroes; by some planters as food for their hogs, which are allowed to harvest them. I have found them an extremely exhausting crop for the land.

The sweet potato is an important root; and they are grown in great quantities; though not to an extent commensurate with their value as an agreeable and nutritious article of food for man and beast. I have bestowed much attention on their cultivation; to the habit and growth, and to the comparative value and productiveness of the different varieties.

Cotton.—The questions under this head would require a lengthy treatise. You will, most probably, receive more than one essay in answer.

If you will send an artist this way, capable of making the necessary drawings and plans of gin-houses, presses, cotton-thrashers, &c. &c. I shall take pleasure in drawing up a lengthy article, which might, by such means, be rendered both interesting and instructive.

You will perceive that in the Plantation Record and Account Books sent herewith, I have provided for much of the information sought for; average yield per acre and per hand; cost per pound or per bale, of production, freight charges, commission, &c., paid by planter, and more of a similar character and of like importance.

Sugar must be left to those having a better knowledge of the subject. It has within the last three years been grown successfully and profitably in the hills thus far north, and upon lands which no longer produced remunerative crops of cotton. There is no reason why it should not displace cotton to a great extent. P. M. Lapice, an extensive and very enterprising public-spirited planter, in the Parish of St. James, has demonstrated for some fifteen years or more, that sugar-cane thrives as well, and ripens as many joints, at his cotton plantation opposite Natchez as in St. James.

Hemp has been grown in this State on the banks of the Mississippi, and that successfully, but I have no knowledge of its cultivation as a crop.

Butter and Cheese.—The former is made in as great perfection as in any part of the world. Every planter's wife makes an ample supply for her table, and occasionally enough for the inhabitants of the towns in the vicinity. But, as a business, I am not aware that it is carried on within the limits of our State; although there is no part of the Union where it could be made so profitable. Good butter averages the year round over 25 cents per pound, often commanding 40 cents, and never under 25 cents.

Land is cheap. Good cows can be had at moderate prices, from $15 to $40, yielding from two to twenty quarts per day, according to the selection of animals, and the manner they are fed. With industry and judicious management, abundant pasturage and an ample supply of green food can be had all the year round. During continued wet weather in winter and early spring, when it would not be advisable to allow the cattle to puddle the land, fodder from the cow-pea, cured vines, peas, and all, as is commonly practiced, with Swedish turnips, beets, carrots, sweet potatoes, cabbages, &c., may be used. A farm should be properly arranged for the business, subdivided, that separate pasture lots of Bermuda grass might be grazed alternately from the first or middle of May until December; buildings erected, or a gin-house altered to serve the cows; cisterns for water, and tanks for liquid manure, to be applied to the grass land kept for the scythe. The subdivisions may be effectively and cheaply made by means of the Cherokee rose.

For the planting and cultivation of this plant, see Nos. 1 and 2 of vol. 5, of DeBows' Review. When a good pasture of Bermuda grass is kept ungrazed, in the fall, so that the grass grows to a height of six or eight inches, the early frosts do not injure it so far as to prevent cattle from getting a good bite until mid-winter. Clover, or Egyptian oats, or rye, sowed in September, may be grazed after Christmas; at intervals, the oats until the 1st of April; the clover until June. If soiling were practiced, all the liquid manure saved in tanks, diluted and applied to Bermuda meadows, clover, peas, drilled corn, &c., from watering carts, the improvement of the land would be rapid and the yield of fodder immense. It is almost imposble for a cotton planter to carry on anything of this kind. It could only be done to advantage on a regular dairy farm.

Horses and Mules are now bred in considerable numbers in some parts of the country, and many of them splendid animals. The business is found to be profitable, and does not in the least interfere with the cultivation of either sugar or cotton. Animals bred here are much more hardy and durable than those brought down the river.

It seems unaccountable that planters in Mississippi do not set determinately to work to render themselves independent of their neighbors for the supply of an item so costly. If they were even to purchase yearling mules from the breeders in Tennessee, Kentucky, Illinois, Indiana, Missouri, and bring them south at that age, they would find the business still more profitable than it has long proved to be to the graziers of those States, who regularly buy up the young stock from the breeders. They are bought when weaned at from $20 to $30; the cost of transportation by steam would be less at that age than when grown, not exceeding $5 per head, including feed and insurance when a number are shipped at once; the cost of

keeping on a plantation for two years would scarcely be felt; whilst the mules would be worth in reality, one half more than if brought south at three years old. Some planters breed the largest sized "cane-tackeys," as they are called, or native ponies of Spanish origin, to well-bred but small stout horses; thus producing a stock of tough serviceable animals, almost as durable as mules.

Mules vary in price from $70 to $125. Horses from $50 to $300. Cane-tackeys, good stout ponies of 12 to 14 hands, from $20 to $50.

Horned Cattle.—I have no means of answering your inquiry as to the number in our State. It is immense, however, and especially in the interior. The principal markets are New Orleans and Mobile, with the smaller towns in the State. A large number are annually *consumed* in the teams from the state of the roads during the hauling season, the carelessness of planters and overseers, and the cruelty and rascality of negroes—who often drive their beasts for days with scarcely any feed, reserving what was given them for use on the road to sell for their own benefit.

The native stock of the country, the large brick-colored or brown oxen, with their singularly twisted ram-like horns, are an excellent breed, making noble teams and fattening readily. Some of the cows, too, are fair milkers. Herefords, Durhams and Ayrshires, have been introduced in considerable numbers and at great expense; but from various causes, have done but little good; the Durhams least of all. Some of their crosses on good native stock are fine animals.

The average price received by the breeder for three-year old unbroken steers, sold to the butcher or drover, is from $6 to $15, according to condition and locality, and at these prices they pay pretty well. Good well-broke teams are worth per yoke from $35 to $60. Cost of keep, I have no means of estimating, nor is it ever taken into consideration.

Sheep Husbandry is a subject of decided interest to this State. It would, however, require a volume to answer the questions propounded as they should be answered.

Mr. Randall, in his letters to Mr. Allston, has accumulated a mass of information greatly encouraging to those who have the desire to engage in this business in the South, lacking, however, much that experience in a Southern clime alone can give. I will only remark that the short and fine-wooled families of sheep do well, whilst the long-wooled do not. I am not aware of a single instance in the South-west in which Cotswolds or Bakewells have done more than to exist for a year or two. Some of their crosses upon the shorter-wooled kinds have done better.

The Southdowns succeed admirably, and have greatly improved the mutton of the country, so far as *fatness* is concerned; as to fineness and flavor, doubtful. The Merino, Saxony, and Saxony-Merino thrive well, and in my opinion improve in quantity and quality of wool.

The improvement effected by a first cross upon our native ewes is great and uniform, both in wool and mutton. I have a small flock of very superior animals, Saxony and Merino, brought South four years ago. During the first two years they throve very badly, and increased slowly. Now, however, they do well and breed freely. I have compared the wool carefully, each clip, and think I see a marked improvement in fineness and softness. As yet I am not prepared to say more. Few planters keep more sheep than enough to supply their own tables with that most excellent dish, a saddle of Mississippi mutton, which compares favorably with the mountain

mutton of Scotland and Wales. They suffer at times severely from dogs.

Hogs.—The queries under this head must also be passed over, for reasons similar to those given above. Many planters raise an ample supply of hogs for their families, black and white. Many more find it a thing impossible, from the destruction of their young stock by the negroes, who have all a particular *penchant* for roast pig, and especially when stolen; and many never make the attempt to raise pork.

Rain.—Herewith you will receive an almanac, in which is a table of the temperature, quantity of rain, &c., which I condensed from the register of the late Dr. Tooley, of Natchez, published in Silliman's Journal.

Labor, its Cost, &c.—Negroes hire out readily at $15 per month for common out-door labor; the owner clothing them, paying physicians' bills, if any, taxes, &c.; the employer boarding them. When hired by the year on plantations, which is rarely done, the employer pays about $70 to $75 for a full hand, paying all expenses, in sickness and in health, unless perhaps taxes, and supporting the children if any.

White laborers, when making levees, canals, ditches, &c., receive $1 per day and board with *quan. suf.* of whisky. Few owners will put their negroes at such work in the swamps, mainly on account of its unhealthiness. At work in the mills they have from $10 to $15 per month, and board. Carpenters $30 to $50. Gardeners from $20 to $50. Overseers $250 to $800, according to number of hands on the place, and the experience and competency of the overseer.

The number who have gone, or are going to California, has somewhat raised the wages of overseers. Intelligent young men from the North and West, who are pretty good farmers, would find employment in this capacity; being content with moderate wages for a couple of years, under the eye of experienced planters on their home places.

Tar and Turpentine.—In the almanac already referred to, you will find all the information I possess on this subject. A number are engaged in the business and find it very profitable. There is great natural wealth locked up in Mississippi, from the want of a complete survey and report, geological, agricultural and economical.

Plaster and other Fertilizers.—During 1842, '43, and '44, I tried repeated experiments with red clover, sowing at various times, but mostly in the winter and spring. The result was invariably the same; so soon as warm, dry weather set in, the plants, though previously making a fine growth *on a good soil*, began to wilt as the day advanced, and by evening were entirely wilted down. By the first of August, scarcely a plant was to be seen, except in the fence corners and around stumps. In September, 1845, I broke up about an acre, consisting of three or four sharp and steep points of *very poor land*, with hollows between, of *good rich soil*. The hollows had been thickets of brier; upon the points scarcely even a stalk of broom-sedge or of poverty-grass could exist. I sowed the whole immediately with red clover, giving the poor portions a powdering of *plaster*, so soon as the seed had sprouted, at the rate of 1½ bushels per acre. During the fall and winter, the clover grew vigorously, showing little difference between the points and the hollows.

As the spring advanced, the plastered portions assumed a deeper green, never flagging a leaf during a very dry time. This induced me to have a bushel of plaster cast over the whole, the poor land thus receiving a more

than double portion. After the very first shower, the effect was manifest and great. The clover on the whole of the lot grew vigorously through the summer, *the poor land keeping the lead.* I cut the whole over for soiling and for hay, when in full bloom about the first of June, I think, getting a heavy cut. It grew out again vigorously, bloomed and ripened a fall crop of seed, and, with the exception of a few straggling plants, died down, roots and all. About the middle of September, the seeds sprouted, and by the middle of October, the lot was as green as ever. It now got another bushel and a half of plaster over the whole. The weeds and briers had been kept down. By the middle of May it was a rich sight, the clover standing fully as high as the knee of a tall man, and covering the ground thickly and evenly, *but most so on the richer land.* It was again cut, the clover being removed only from the richer spots. On the rest, it was evenly spread and left as a top-dressing. The second crop was much better than the first upon the ridges, showing distinctly the effects of the top-dressing. The whole was cut *when in blossom*, and made into hay, *which salivated everything that ate it*, horses, mules and cows, and was ultimately used for bedding. The first crop did not produce this effect. The second crop salivated even hogs, turned upon it to graze. The third year the clover was not so good, still yielding fair crops, however, of which the first was made into hay, and the second ploughed in when at its best. Last year it was in corn, without manure of any kind, and was 50 per cent. better than on similar land, differently treated. Even the poor ridges have a full crop of large, well-filled ears. This year I am appropriating it to a permanent layering-ground for evergreens, being within the limits of my nursery. It faces the north.

The results of other experiments, upon land of different degrees of richness, and with every exposure, have been the same; proving distinctly that red clover can be grown as successfully here as in New York or Maryland, when *manured with plaster;* that the plant becomes here almost an annual, but few continuing to live after going to seed in the fall, and these being weakly when compared with seedlings. Of many neighbors who saw the results of these experiments, and had the matter explained to them, but one has followed them up, and *that a lady!*

With the cow-pea in all of its varieties, with vetches, tares, lentils, the different garden beans, young locust, acacias, &c., white clover, the results are equally marked. By the application of from 1½ to 3 bushels of ground plaster to the acre, a heavy cover of peas can be produced upon the poorest lands of this region. The peas ploughed in and followed by clover, or Egyptian oats and clover, and then fed off in the spring to be followed by peas, also to be eaten down by hogs and sheep, sowed again with clover in the fall, to be carefully turned under in the spring, will renew any land.

Wherever plaster is applied to land not utterly worn out, a thick cover is produced of white clover, or of a rank-growing species of *medicago* or snail-clover with a small yellow blossom, relished only by cows and some mules. The white clover salivates every kind of stock so dreadfully that I look on it as a pest.

I have also applied plaster to Bermuda-grass and to corn, but not with the same effect as that produced on clover, &c., still decidedly beneficial.

I have procured the plaster used partly in New Orleans, at from $1 25 to $1 75 per cask of about 6 bushels, the freight and drayage being another dollar; and partly from the makers of soda water.

Eight years ago I picked up some crystals of pure sulphate of lime, in

the form known to geologists as *selenite*, near Clinton, in this State; they were exposed in excavating for the Vicksburg and Jackson railroad. On farther investigation, I found it in considerable abundance, and have no doubt that an ample supply could be there obtained. I enclose you a specimen. About the same time, I pointed out extensive and inexhaustible beds of marl, in many parts of this district, the existence of which was hitherto denied here. I have used it to some extent and with marked advantage. Herewith you have a specimen, which please hand to my friend Dr. Gale for analysis, the result of which I should be glad you would add in a note. From a partial analysis made, it is rich in carbonate, phosphate and sulphate of lime; its effect upon the land is decidedly mechanical and chemical; making it friable and easy to work, and retentive of moisture; whilst it furnishes much that our soil and subsoil require of inorganic matter. It would occupy too much time and space to specify the results of different experiments. Suffice it to say, that in her vast beds of rich marl, Mississippi possesses a means of improving all of her worn-out lands that are not already too much gullied ever to be reclaimed.

Swamp-muck, leaf mould from the woods, horns, hoofs and bones, the last broken to pieces with a sledge and used in that state, and also dissolved by means of sulphuric acid, as directed by Prof. Johnston, the offal of the slaughter-house, and the bodies of animals, ashes leached and unleached, sawdust and spent tan-bark, cotton-seed, &c. &c., I use to as great an extent as in my power, and with the same good results so often stated.

Guano, upon many plants; the result upon a part of the sweet potato crop this season was most marked. The soil thin, worn, yellow clay; the potato variety *yam;* the guano at the rate of about a bushel per acre mixed with an equal measure of plaster sown along the ridges, the plough immediately following; the result, *a less growth of vine*, with more than double the quantity of potatoes, and these all large and fine.

Lime, only used as first related in the shape of marl, or of sulphate of lime and on fruit trees, as will presently be stated.

Orchards.—No portion of the Union is blessed with a soil or climate more favorable to the production of fine fruit than this and most other parts of these Southern States. An opposite opinion has unquestionably, but most erroneously, been entertained. There have been many failures certainly, but from very obvious causes; whilst many, the writer being of the number, have succeeded in ultimately overcoming the difficulties to be contended with, and in producing fair crops of fine fruit, apples and pears included.

The greatest impediment to success has been *the want of acclimated or naturalized trees* to begin with. Of peaches, such were to be had, native seedlings many of them decidedly fine. But for apples and pears, the sole resources were the nurseries in the Northern States and in Europe.

The subject of the acclimation of plants has been one of long and earnest dispute among the learned. As to their theories, they are of no moment; the facts are these:—

Every planter knows that if the corn in the crib be likely to prove short he may secure a supply, at least six weeks before his main crop will ripen, by planting a few acres of *boat corn*, that is, corn the production of a more northern climate, most commonly of Ohio or Kentucky.

That the yield, though earlier ripe, will be lighter than if he had planted

seed grown here, that if the second year he plants of the produce of his *boat corn*, the plant will be *later*, *stouter* and *more productive*, though not so early by some weeks as the year before, and that a third or a fourth year identifies it with southern corn. We may add the singular fact, that our native or southern corn will stand uninjured by a late spring frost, which shall cut to the ground and utterly destroy the plant from northern seed, growing in alternate rows!

The fact is notorious, that though garden seeds of northern growth will generally give us earlier vegetables, snap beans become stringy, squashes hard, cucumbers ripen, lettuce and cabbage go to seed, &c., much sooner than when from southern seed.

With roses and other shrubs, it is necessary to get a new growth *from the root*, entirely new wood, before they will flourish or thrive well.

And so it is with fruit trees.—The wood grown in a cold climate is adapted to that climate—to a cold long winter, and a short summer. When such trees are brought here, even if received in good order, which is a rare circumstance, they may grow off with some appearance of vigor for a time; but when warm weather has set fairly in, they begin to suffer; the leaves look dry and shriveled up; the tree is with difficulty kept alive by wrapping the stem and branches with moss, by mulching and watering, but soon, most commonly by the middle of July, every leaf has dropped and the tree either dies outright, or lives to make a faint attempt at a second year's growth. Occasionally, when headed well back, that is, the branches shortened, or the stem cut down to within a short distance of the bud or graft, and treated as just mentioned, they may live and grow, and ultimately bear fruit, but sparingly.

In the mean time, by budding upon vigorous native stocks, one step towards acclimation is made. In no instance have I found *an old stem*, wood of even one year, overcome the effects of the change of climate, and make a thrifty, vigorous fruitful tree.

Of three hundred varieties of apples, two hundred of pears, thirty of cherries, forty of plums, and now in cultivation here at Ingleside, fully one half will ultimately overcome the effects of change of climate and become naturalized. Every means is being employed to bring about so desirable an end.

Pears, which seem to adapt themselves of all fruits the most readily to our climate, are being grown upon several varieties of the quince, some upon their roots or upon seedling pears; and others, such as the seckel, on apple stocks; or the St. Michael, on the French Doucin apple.

Of apples, some are worked in the usual way on seedlings; others on their own roots, and on the Paradise or Doucin apple. The cherry thus far grows vigorously, the leaves persisting until frost on the mahaleb or perfumed cherry. The *monstreuse de Negel* and several others promise fruit next season, and so of other fruits. The quince as a stock for the pear, the Paradise and the Doucin for the apple, and the *cerasus mahaleb* for the cherry, all have the same effect; that of dwarfing, and causing early maturity and fruitfulness.

My experience leads me to state emphatically, and that of hundreds of others will bear me out, that success in fruit-growing, thus far south, need not be expected where reliance is placed on individual trees of northern growth, though, by perseverance and some degree of skill, most of the finest northern and European *fruits* may be successfully naturalized.

Another important item to be considered, in growing fruit thus far south, is the protection of the stem and main branches of the tree, and the shading of the soil around the roots from the powerful rays of the sun; to be properly effected by training the trees with a low head, and, at the same time, encouraging a thrifty growth; thus insuring an ample foliage. All trees seek to protect themselves in this way; and especially those with a smooth, glossy bark, which is so well calculated to absorb the heat of the sun's rays.

The bark of an apple, pear, or peach-tree, upon which the bright sun of this climate has been pouring his rays, through a long summer day, is *hot* to the touch, and even the sap will be found, on applying the tongue, to be of an equally high temperature. How can healthy, unblemished fruit be expected under such circumstances?

It is of more importance here than in a cooler climate, that the point of junction between the stock and scion or bud be *at* or near the ground. The causes need not be stated—to every nurseryman they will be obvious.

Overgrown, forced trees, produced by very rich soil or heavy manuring, do not suit a southern climate, nor, in fact, are they anywhere equal to those of a moderate growth.

Especially are they objectionable for planting out on the poorest hill lands of the south. In such a location, trees which have been grown on rich land *starve* and burn out directly, even if well manured, whilst thrifty trees of moderate growth, whose shoots are short-jointed and well ripened, scarce receive a check.

The difficulties referred to in procuring acclimated trees of pears and apples, have led to the almost exclusive cultivation of the peach, which though occasionally produced of the highest excellence and in great abundance, is an uncertain crop; not only so, but as a fruit for market, they are altogether inferior to the apple and especially the pear.

Great care is requisite to carry them in safety to New Orleans; the more, as freestone peaches alone are saleable in that market, whilst an accidental delay of a day or two entails an entire loss. The pear and the apple, on the other hand, very rarely fail of a good crop; may not only be carried to New Orleans in perfect safety, and in good order, but will suffer no injury from a detention of several days; and their season extends through some months earlier and later than the peach.

As it is my intention to give to the world, in a few months, a familiar treatise embracing the entire *gardens and orchards in the South*, I shall not extend these remarks much farther.

The low lands of the Mississippi, where dry or properly drained, are admirably adapted to the growth of the pear; and more especially when worked upon those free-growing varieties of the quince used for this purpose.

It has been stated that the fall and winter varieties of the apple, those that are such in a northern climate, are worthless here. This is altogether a mistake, and has arisen from a misunderstanding of the matter. Although the summer and early fall sorts are most profitable and uniformly productive here, the latter kinds are almost equally so, but ripen at too early a period to keep well, or in fact to keep for any great length of time after they ripen, say more than a month or six weeks; and, indeed, I have found that the later the period of ripening the more difficulty in acclimation. Still many late fall and winter fruits, the Newtown pippins, for instance, produce

and thrive well, and by preservance I hope in a few years to succeed equally well with a great proportion of the finest kinds. Ripening, as all the sorts do, long before they can be brought down the river, they command high prices.

Lime is an absolutely indispensable ingredient in the soil in which fruit trees of any kind are grown, and especially the apple and pear.

Until I was convinced of this fact, I found great difficulty in producing a healthy and vigorous growth upon many varieties of the apple. By *marling*, I removed the difficulty; the wood became short-jointed and healthy, the foliage abundant and persisting until frost, and the fruit large, sound, and free from specks or blemishes, such as before disfigured some kinds.

On grapes and the making of wine, it is unnecessary to say more than reiterate the statements of Dr. Weller, of North Carolina, relative to the incalculable value of the *white Scuppernong* to these Southern States for this purpose, and for the table.

It succeeds fully as well here as in North Carolina, whilst the fruit is decidedly larger and the juice richer.

It is a native grape, bearing the same relation to the muscadine of the woods that the Newtown pippin does to a crab-apple.

I have thus endeavored to answer your several queries as fully as possible, at the same time condensing as much as practicable.

I am, dear sir,

Yours with respect and esteem,

THOMAS AFFLECK.

Hon. Thos. Ewbank,
Commissioner of Patents.

Near Manchac P. O., Parish of Iberville, La., *Oct. 8th*, 1849.

Sir:—Your circular in regard to agricultural statistics came duly to hand, and with pleasure I contribute my mite to advance your laudable design.

Situated as I am, 15 miles below Baton Rouge, on the borders of the Mississippi River, makes it about the centre of the sugar region of this State; consequently we may be considered in the fullest sense a planting people; depending on one article (sugar) for our profits and revenue; and I shall confine myself to that article, with the incidental products for our own consumption, that we grow for the reason that it is better to grow than to buy.

Sugar.—The average product of the State, I would say, was about 1,000 lbs. and forty gallons of molasses to the acre.

A new process of cultivation that has now been in practice a number of years is planting the rows from 6 to 10 feet apart, instead of from 3 to 5, as was the former plan. The advantage of the wide drills over the narrow is that it gives the plant air and sun, enabling it to mature on strong land, and even on new land just brought into cultivation from the forest, and insuring a good quality of sugar from it. Under the old process of narrow drills, no planter thought of putting land in cane until it had been planted some 8 or 10 years in corn, so as to temper it down to that point by cultivation, and burning off the litter in the spring, so that the cane would not grow too large to mature sufficiently to make sugar.

But a few years back it was a universal custom to burn off the cane fields before we commenced ploughing, which was absolutely necessary in the narrow planting, to be able to plough, as the quantity of litter from the

cane crop, even after the matured part is taken off for the mill, exceeds any other crop that is grown.

It has now become very common, and rapidly growing into favor with the most successful planters, to bury all the litter with the plough in the middle of the rows as early after the sugar crop is taken off as possible, giving time to decompose before the finishing cultivation of the succeeding crop.

I would here remark that western purchasers of sugar have told me that the sugar made in the Rillieux apparatus has grown in great disfavor with consumers in the West and South-west, from its decomposition of grain, after standing late in the season, causing it to have an unpleasant smell, and being deficient in strength; that is, taking a much larger quantity to sweeten a cup of coffee than of common brown sugar made in the ordinary way in open kettles.

Several enterprising planters on the highlands of this State are erecting this year very costly apparatus, with the fullest confidence of success in making fine sugars and enhanced profits. The success of which, as with all other enterprises of this kind, I consider veiled in futurity.

Varieties of Cane cultivated.—The Creole and Otaheite canes have long given way to the ribbon in this State. Two varieties of the latter are almost universally in favor here, as best adapted to our soil and climate. The striped ribbon cane grows the largest, and is most esteemed for old lands, while the red or violet ribbon cane is most in favor for strong or new land, from its not growing so large as the striped and thought to mature earlier.

Disease of Cane.—The opinion is seriously entertained by many of our most intelligent planters that a disease similar in its consequences to that which caused the whole cotton-growing region of the U. S. to abandon the black seed cotton, from 1820 to 1827, is beginning to affect sugar-cane.

For the last three years, great complaints have been made in regard to the loss of seed cane. More than the ordinary loss was experienced in the planting of the crop of 1847, which caused more than usual care and attention in mattrassing the seed cane that autumn; but with all the care and skill, it was found that when the planting season came a still larger proportion of the seed cane was damaged than the year before, and that, although the bud or eye of the cane was dead, the cane was plump and sound, except showing black or decaying specks around the joints. This led to still greater care in putting up the seed cane in the autumn of 1848, but to no avail, as in many instances entire mattrasses were wholly unfit for planting, as not one in a hundred eyes was sound. I am credibly informed by many planters that for the last month or more they can perceive the same appearance on the joints of the cane now growing and apparently healthy.

This *Ribbon* was introduced into this State from 1820 to 1825, but I have as yet been unable to learn with precision whence it was imported. Feeling convinced that the present stock of cane here is becoming seriously diseased, or "*run out*," I imported two hhds. of seed cane from Cuba last winter. I however did not succeed in getting the ribbon cane, as I desired and ordered. It was invoiced "crystaline;" a very large proportion of the eyes of this cane had been rubbed off by the rolling of the casks, no doubt in the shipping and reshipping of it. (It should be packed in square boxes, not too large for two men to carry.) What came up of this "crystaline" is of fine size, very healthy and vigorous, and has matured or sweetened well; though it is now sufficiently matured to determine its color, I fear it will turn out to be, what we occasionally find in both varieties of the ribbon

cane, a *bastard cane*, so called, always remaining of a light dun or dirty-white color, and which is considered too delicate for this climate.

Cost of making Sugar.—I estimate the cost of making sugar in this State at 4 cents per lb.

The expenses incurred on the sugar, of charges, freight, commissions, weighings, storage, &c., paid by the planter, amount to $\frac{3}{8}$th of a cent per lb., and about 3 cents per gallon on molasses.

I would here suggest that the sugar interest of the South might be greatly benefited by the government, through our consuls in the sugar-growing countries, by procuring and distributing among the most enterprising planters new varieties of cane calculated to supply the place of our own diseased stock.

Our consuls resident in cane-growing countries, enjoying as they do facilities for observation and for procuring information, might effect what it would be almost impossible for private enterprise to accomplish.

Maize (*Indian Corn*).—Next to sugar our most important crop is Indian corn. For the old stubble land the Spanish or creole corn is most esteemed, as it appears to be much hardier than the common white gourd-seed; it is a hard yellow flint corn, too hard for stock in its natural state; the stalk is much larger than any other variety, produces more fodder, is slower of maturity, and consequently less injured by excess of seasons, moisture or dryness than any other corn.

The tendency of all corn in this country is to become more flinty or harder. The continued cultivation of the soft gourd-seed corn from the western States will here produce a hard flint corn in the course of a dozen years, the cob increasing in size as it becomes flinty.

The average crop in stubble land is about 20 bushels to the acre, in new land, or that not exhausted by corn, the average is forty. Fifty-six pounds is the legal weight of a bushel of corn in our State.

Cow-Pea.—The next crop in importance to corn, to the sugar planter, is the cow-pea, both as a restorative to exhausted cane land, and as provender to the numerous teams necessary to the cultivation of a sugar estate. Hay made of the pea-vine when in full bearing, but before the peas have reached maturity, is esteemed by most practical planters far more valuable than either blades or shucks.

Peas are universally drilled or sown broadcast in the corn-fields at the last ploughing; and as a rotation, appear better adapted to the successful preparation of old land for cane than anything that can be sown.

After the stubble of exhausted cane land is ploughed up, which is generally every fourth year, one year in corn well set with peas will enable the land to produce three successive crops of cane of good size, provided the whole of the peas together with the stalks of the corn are turned in by a deep ploughing early in winter before making the next planting of cane.

I have no doubt this rotation of one planting of cane, and the two succeeding years of rattoons, with the litter from the cane ploughed in as described, and alternated every fourth year with the corn and peas, will forever maintain the alluvial lands of the Mississippi fully equal to the successful production of sugar.

Crab-Grass Hay is also an important item with the sugar planter, on the numerous roads of a sugar estate. Between the "laying by" of the crop of cane and the rolling season, it grows luxuriantly, and to sufficient maturity to make most excellent hay, fully equal to the best fodder from cornstalks.

The sweet and Irish potatoes, turnips, pumpkins, melons of all kinds, as well as all kitchen vegetables, grow here with little trouble.

Orchards.—Apples, pears, peaches, oranges, figs, pomegranates, pecans, and other fruits and nuts, grow here to great perfection.

Our dairies and poultry yards with little care, furnish an abundance of their products for the use of the respective plantations.

Yours respectfully,

J. N. BROWN.

Hon. THOS. EWBANK,
Com'r of Patents.

LISBON, UNION CO., ARKANSAS, *November 28th*, 1849.

DEAR SIR:—Having received a copy of the circular inquiring for agricultural and other information, I submit the following observations relating to cotton culture, which you will use as your judgment may direct.

The location of this county is in latitude 32° 18′—long. 15° 30′. Cotton is the most important product of this portion of the State. The crop will necessarily be short this year, in consequence of the unusual late frost in the spring, the devastations of a small insect, vulgarly called "lice," and the very heavy and constant rains from the first of June until August. The crop of cotton was also materially injured by the boll-worm. The quality of the present crop will be ordinarily good, which is owing to the very favorable fall for picking. The average yield per acre will be 450 lbs. seed cotton. What will be the amount of the crop for '49 is very doubtful; yet it is certain to fall much short of the average production since the settlement of this country, but in consequence of the much more land planted in cotton, it is probable that the export will be as heavy as it ever has been. The average production since the settlement of this portion of Arkansas, excepting '48—'49, is about 800 lbs. per acre. The export from the State last year was 188,000 bales, as now published, and no doubt generally correct. The soil of this section is a light, loose loam, in which the *oxide of iron* in some, and *sand* in other places, predominates. This is based on very thick, tenacious substratum. The country abounds in chalybeate springs of every possible strength; and is very humid, especially throughout the spring and summer. In consequence of the solid substratum of clay, the land receives kindly manures of nearly every description.

Cotton-seed is the only manure much used, and the methods practiced are various, yet they all agree in their ultimate result, which is essential in the use of this as a fertilizer, viz: the decomposition of the seed. My method, which I prefer after trying the different plans, is to keep my seed sound until used. For cotton, I open a furrow with a small plough in February, and sow the seed down in the track and cover it with a turn-plough, two furrows, one from each side; afterwards in the spring I bed out the land, throwing on the ridge containing the seed, over which I plant my cotton. Land of middling quality will yield one-third more by being manured with cotton-seed, and 15 bushels per acre is generally enough. If more is put on the land, and it should be dry, the crop will be materially injured, but if wet it will bear more without injury.

There are several varieties of cotton cultivated here. The *Petite-gulph*, the *acclimated Mexican*, and the *Prolific* and *Bunch* cottons. The Bunch

and Prolific are preferred by those who have tried them. There are more varieties, and I cannot with certainty give their history. But I am satisfied that they are produced by a mixture of seeds grown upon different soils and in different latitudes.

The method of cultivating cotton differs in the various soils. The principle always to be kept in mind in preparing land for cotton is to prevent an undue amount of moisture in stiff lands; and, on the other hand, in sandy soils, to guard against a want of this necessary element in vegetation. Therefore, high beds in the former, and almost none in the latter, will bring most favorably to bear the three essential conditions of rapid vegetation, heat, moisture, and light. The more rapid the growth of the cotton plant in spring, and the quicker it matures, the greater the yield. Upon well-managed cotton plantations, making a support of corn, meat, &c., 4 bales of 500 lbs. each per hand is a fair average. The average price of cotton for eight or ten years past may be set down at 6 cents per pound. Therefore, 2000 lbs. at 6 cts. will amount to $120 00

Expenses on 4 bales,			
Freight, ...	$4 00		
Commissions, 2½ per ct., . .	3 00		
Bagging and rope, . . .	7 00		
Storage, drayage, and weighage, .	75		
Insurance, fire, and river, . .	1 50		
		$16 25	
Expenses per hand,			
Clothing and taxes, . . .	14 50		
Ten per ct. on mule and horse capital,	10 00		
Wear and tear of farming utensils, .	5 00		
		$29 50	
Expenses of making the 4 bales, . . .			$45 75
Clear profit per hand, ...			$74 25

This calculation is a fair average gain per hand throughout this locality.

I have learned from experience that much is lost to the cotton planter from having the cotton rows too wide, and the stalks too near in the drill. I find 3 feet by 4, one stalk in a hill, will form more regular limbs all around the plant, will bear more, make their fruit earlier, bolls larger, and staple better matured—and it is, besides, thus easier cultivated with the hoe, and the yield considerably above the average already given. A single cotto plant, well cultivated, at proper distance, will yield ½ lb. seed cotton. As over 3600 hills, 3 feet by 4 will stand upon an acre, the produce must necessarily be much above the common yield. Farms here are generally badly cultivated, from over-cropping, and want of proper manuring.

Very respectfully,

D. R. COULTER.

Hon. Thomas Ewbank,
Commissioner of Patents.

Memphis, Tennessee, *November 6th*, 1849.

Sir:—We submit the following remarks in regard to this portion of the State of Tennessee in reply to the various inquiries in your circular:—

Wheat.—This grain is not extensively cultivated in this section, though it grows well, yielding, without manure, about 15 bushels per acre. The *Red May* is the variety best suited to our climate, ripening the last days in May. Our driest soils are considered best adapted to this grain. The growing crop is subject to no disasters or enemies, except storms and rust; but the weevils often destroy the grain before it can be well prepared for grinding.

Oats.—Next to Indian corn, this is our most valuable food for stock—and the culture is increasing with us, not only from its value as food, but also because it furnishes fine pastures after the grain has been taken off, keeps down noxious weeds and briers, and is made and secured with but little labor. The common *Black* and *White*, and the *Ruffled* oats, are the varieties principally cultivated. The latter generally has the preference, because it ripens a few days later (10th to 15th July), which suits the time of a cotton planter better than an earlier harvest. Average yield from 25 to 30 bushels per acre.

Indian Corn.—With us this may be regarded as the "king of grains." It constitutes the chief food of every animal, from man down to the marauding rat, while its dried blade furnishes us with seven-tenths of the long food for our working animals. The *Large White* is the variety most esteemed, and most generally cultivated, for the reasons that it yields more grain and fodder, makes, when ground into meal, whiter and sweeter bread, and is less liable to injury from the weevils. The blade is usually esteemed the best long food for horses, exceeding in price the best northern hay; the average price may be stated at about 70 cents per cwt. The shuck is fed to cows and young mules, which they eat, but with less relish than they do the blades, which are sweeter and more nutritious. The former are much used for mattresses, being preferred to moss, as they are cleaner and easier manufactured. When mixed with coarse cotton, and properly prepared, they will make a mattress but little inferior to curled hair—price about 50 cents per cwt. The average price of this grain may be set down at 40 cents per bushel; and the yield on upland in this part of the State may be stated at about 30 bushels per acre.

Rice.—Of this grain but little is cultivated, though it grows and matures well. The only planter of our county who has given it his attention was the late Col. Andrew Rembert, under whose management it was a profitable crop.

The cost of raising the several mentioned grains may be stated as follows:—Corn 30 cts. per bushel—wheat 40 cts.—oats 15 cts.

Peas.—This crop is cultivated for food for man and animals, and also for enriching or improving the land; for the latter purpose, being considered equal to clover. Cotton flourishes after a full crop of pea-vines as if planted on virgin soil. Many planters esteem peas almost equal to corn for rearing and fattening stock. Black peas are most esteemed for stock, because they remain in the fields without rotting all winter: and when cultivated with oats, will give a fine crop after the oats have been taken off—provided the field be not pastured. They are often planted among corn, and receive a *working*, as it is called by the last ploughing given the corn, and yielding from 7 to 10 bushels per acre. Considering the labor required and the condition in which the field is left, this is, perhaps, the most valuable crop grown at the South. Usual price one dollar per bushel.

Cotton.—This is the great staple of all that portion of our State whose

geographical position slopes to the south-west, comprising that section of Tennessee whose waters flow towards the Mississippi. The cultivation of cotton engages the chief care of every planter, and is the main source of wealth. From the constant and long-continued working of the soil necessary to produce a good crop, together with the fact that nearly everything produced is removed from the land, this is one of the most rapid exhausters of the soil that has ever engaged the attention of the agriculturist. The average yield to the hand employed in its culture would not exceed 1,500 pounds of baled cotton. With us but little attention has been paid to manuring cotton fields, and 6 cents per pound is as low as cotton can be made in any part of this State. Although we are on the extreme northern verge of the cotton region, we are authorized in saying that nowhere else has there been more laudable emulation amongst planters to improve the quality of our favorite staple, and send the finest samples to the New Orleans market. Indeed, it has been conceded by the brokers in that market that the county of Shelby is entitled to the high praise of having surpassed any other portion of the south-west in the exhibition of the finest premium samples.

The inquiry at once arises, to what cause is this alleged superiority to be attributed? Consistently with long-established opinion, we cannot ascribe it to superiority of climate. Yet the experience of the last year has demonstrated beyond dispute that the climate which is most favorable to a prolific crop is not necessarily most congenial to the production of the finest staple. For though we do not pretend to rival the more southern portion of the cotton region in production per acre, we can most successfully vie with them in the quality of our staple, as well as in all the mechanical appliances in preparing the crop for market. In comparing the average annual production of our lands, say 700 lbs. per acre, with the exaggerated estimates of an abundant crop in more southern latitudes, the odds would seem to be against us; but when we make a proper deduction for the ravages of the caterpillar, the worm, the rot, and equinoctial storms that prevail almost every year in a warm climate, we very much doubt if the advantages of a comparatively northern temperature, in exempting us from these calamities, do not render the culture of the plant as profitable here as anywhere else. The amount of merchantable cotton that will be shipped from Memphis this season is estimated at 150,000 bales—embracing the crop of six or eight counties, and the average product of the crop in this portion of the cotton region will compare advantageously with any other quarter we have heard from.

Horses and Mules.—Many of both are raised in this State, and of very superior quality. Horses for the saddle and harness, and mules for the plough, the wagon and the dray. Many are sent every year to supply the wants of our more southern neighbors in Mississippi, Louisiana, Georgia and Alabama.

Of *Horned Cattle*, we only raise an abundant supply for home use.

Of *Sheep*, while the middle portion of our State contains some as fine flocks as there are on the continent, we have but few, and these of poor and common breeds, receiving but little attention, being allowed to roam over the fields and woodland pastures, choosing their own lodgings and providing their own food. And as many of us are descendants of the constituents of Col. Macon (partaking by inheritance of his social as well as political peculiarities), who owned *thirteen dogs himself*, and allowed to each of his

negroes *at least one*, about half of our flocks are annually killed by dogs.

In conclusion, we are pleased to report for your information that the manufacturing spirit is beginning to develop itself here; enterprising efforts are making to diversify the employment of a portion of the labor and capital of the county, by the erection of a cotton factory, a merchants' flour mill, and a bagging factory, in our city. These establishments have long been needed here, and will prove powerful agents in developing the natural resources of the country. No other expense has fallen so heavily on the cotton planter for the last few years as the unreasonable price he has had to pay for the article of bagging. And it is a matter of surprise that the value of this enterprise, and the investment of capital to supply this great demand in the South, should alone be understood in the States of Kentucky and Missouri. The central position of our city to the commerce of the whole South and West, by which it commands a flourishing trade with the interior of an extensive back country, must necessarily present great inducements for the investment of manufacturing capital. The aggregate exports of this city at the close of the business season, consisting of cotton, corn, live-stock, &c., will amount to $7,500,000.

Very respectfully,

JOHN POPE,
SAMUEL BOND.

Hon. Thomas Ewbank,
Commissioner of Patents.

Sugar Grove, *Licking County, Ohio, Sept. 25th,* 1849.

Sir:—I have received one of your circulars, seeking practical information on agriculture, and things in connection therewith.

I feel diffident in putting forth my experience on a subject in which many have spent much more time, with perhaps much better opportunities for investigation than myself; but will on a few points of agriculture, in which I am particularly engaged, say a little, of which you will of course make such use as seems best.

1st. *Wheat.*—I have in the last three years cultivated six kinds of winter wheat on upland, second bottom, and first bottom. I have sowed the different kinds in such location, and cultivated them in such a manner (frequently two or three varieties in the same field), as to give me the best opportunity of judging of the comparative value of each.

I have been more successful with the *Mediterranean* than any other—it stands the winter better, is less subject to injury by the fly, ripens one week earlier than any other, and two weeks earlier than some; thereby escaping the worst effects of the rust. It is the heaviest of any one crop, weighing 65 lbs. (60 lbs. being the established weight for a bushel of wheat); it has, one year with another, produced the most bushels to the acre. I think from all I can learn that it is much the best variety for this locality; other kinds may succeed in some places better. Our principal enemy has been the Hessian fly. I understand the midge, too, has done much damage a few miles west of here the past season. The rust is the only disease that has much injured the wheat in this country this year; hundreds of acres have been nearly ruined by it; I think the *Mediterranean* is the only kind that has all been harvested. I have not known any of that being left standing

as not worth the labor of harvesting. My own experience is in favor of upland light clay soil, as far the most sure; but occasionally the bottom lands produce excellent crops.

I prefer to enrich my wheat lands by pasturing with sheep. The application of manure, if made, I think should be well-rotted compost, or barn-yard manure, long manure tending to produce too much straw.—My time of sowing, from the 20th of September to 10th of October; average crop for the three past years, 18 bushels per acre. I prefer to plough well once, and but once, even on sod land. Cost of cultivation per acre, including seed, $5 75. Wheat has twice within the last 16 years been injured by late frosts in the spring. Those kinds which are the most forward would undoubtedly suffer the most from this cause.

Indian Corn.—I esteem this a very important production in this part of Ohio; our corn is mostly of a mixed character; I have used for several years the *yellow gourd-seed* principally, and esteem it the best for this latitude; larger and later kinds may perhaps succeed further south. It ripens about early enough, and produces a good-sized ear with deep kernels, tolerably easy masticated when fed in the shuck to cattle, and easily shelled when fed to hogs in the ear. It produces more shelled corn to the given amount of ears than any other I have grown, and weighs when clean 56 lbs. to the bushel; that being our standard weight. We have several kinds of flint corn, all of which ripen a little earlier than this; and we have the *white gourd-seed*, and some others that are later. There can, I think, be no doubt but all the varieties of corn, with good cultivation, gradually, but steadily, in good seasons advance to the standard best adapted to the particular climate where it is grown; and I think I can discover in my experience (which is short), that the corn of central Ohio has a tendency to modify itself from the coarse large gourd-seed, on the one hand, with deep dented kernels, and the hard flint of the north with smooth short kernels to a medium between, which will produce eventually, with good management, the corn best adapted to this locality. I esteem the shuck or husk, if used immediately after the ear has been taken from it, as worth more pound for pound than the blade, and both together, deducting the stalk, when well preserved, as worth more for horned cattle than the best of hay, weight for weight. I this season mixed two kinds of seed together to try the effect it would have.

I have had little experience in feeding ground or cooked food to stock, and would prefer for common feeding, where labor is as high as it is here, and grain as cheap, to feed my corn to cattle from the shuck, and to hogs in the ear, and ground with rye to horses. Corn with us has as many enemies, if not as deadly ones, as wheat. In the spring the ground mole, the cut worm, and various kinds of beasts and birds; in the summer the grub worm, the last a very serious enemy, which has destroyed much corn in these parts the last few years, and for which I know of no remedy, but should be extremely glad to find one. The others, even to the ground mole, may be prevented by soaking the corn in a solution of copperas, and putting tar upon it, and then rolling it in lime before planting. There is a disease that has made its appearance within the last few years that has not been noticed by writers, or if so, has escaped my observation. I am not aware that it has affected the ear perceptibly; I will call it the blight. It seems to strike the leaves, and they turn black more suddenly than if affected by a hard frost. It seems as yet to be confined to the lower leaves,

and I think comes on in extremely warm weather. I had a field of ten acres last summer about the 25th of August, where nearly all the leaves below the ear, and some above, became black, and I have noticed some fields somewhat affected this season. I am of the opinion that the influence is atmospheric, and have some fears that if it continues it may prove quite injurious to corn, by destroying much of the fodder, and preventing the kernel obtaining its full size. The cost of growing an acre of corn, and putting it in the shuck exclusive of the use of the land, is about $6 75. My own average 60 bushels; average of the county 30 per acre.

Hay.—I esteem mixed hay as more valuable for feeding any kind of stock, than either clover or timothy, but we are under the necessity of using those kinds of grass best adapted to the land on which it is to be grown.

Sheep Husbandry.—Merino, and a mixture of Merino and Saxon, are the kinds most raised in this vicinity. The condition of this branch of industry is flourishing. The clip of the county last spring was about half a million lbs.; average price obtained, 26 cents per pound. The weight of the fleeces of our best Merinos would average about 3 lbs.; those that have more Saxon blood, 2½. Many flocks of common or native sheep will yield about the same as the others. My own observation is that less depends on the fineness of the wool than the management and keeping of the flock. I have a flock of between three and four hundred, about ¾ blood Merinos; my average clip for the last four years is about 3¼ lbs. I estimate the cost of keeping sheep at one dollar per year per head. Our wool is principally sold to the manufacturers of the New England States and their agents, who generally call upon the wool-growers at their homes, and purchase their wool. Some lots are sent East to the wool depots and commission merchants.

Labor.—The cost of labor is about one hundred and thirty dollars per year and board. Cost of boarding, five dollars per month.

Grape Vines flourish in this region, but few kinds of the grape mature well, except the vines are fastened to walls of brick or stone, in which case the most approved kinds succeed tolerably well. I have had no experience in the manufacture of wine; central Ohio will be found too far north to favor the cultivation of the grape for that purpose—but with suitable care, enough may be raised for table use.

Sugar.—I have a grove of two hundred and fifty sugar trees, from which I make on an average one hundred gallons of molasses, which sells readily at 75 cts. per gallon. The seasons are so variable that it renders the business extremely uncertain. I think the cost of making maple sugar cannot be on an average less than ten cents per pound. I have, however, in some seasons, made it at an expense of five cents per pound.

Very respectfully yours,

WM. S. WRIGHT.

Hon. THOMAS EWBANK,
Comm'r of Patents.

OAKLAND FARM, NEAR SPRINGFIELD, CLARK CO., *Nov. 6th*, 1849.

DEAR SIR:—It is with much diffidence that I attempt to answer the queries you have sent me, but my experience, so far as it goes, you shall have freely.

First in importance and first on the circular is *wheat.* We have some ten or twelve varieties, of which only 3 or 4 are under names known out of the neighborhood. That in most general favor from its productiveness and early maturity is the *Mediterranean.* This has a large berry with thick dark bran, and weighs from 60 to 66 lbs. per bushel. It has improved in quality of late years, and with care in grinding makes a very fine quality of flour. The *old red-chaff bearded* is fast getting out of favor from its failure within five years, though never considered very productive; yet it withstood the fly, frost, and rust better than other varieties. Usual weight from 58 to 60 lbs. with good crops. The *Wabash* is a bald wheat, very thin white bran, stands well, grows well in low and rich ground, not much raised from its lateness in ripening, and not more than one crop in three is first rate. Weighs 56 to 60 lbs.

Yellow lamb—bald, a beautiful and productive wheat when it fills well—very liable to smut. Average weight 60 lbs.

Shot Wheat.—A variety lately introduced here from a neighboring county, under what I suppose is a local name, but denoting well its peculiar plump character. Ripens about the same time with Mediterranean; bearded; a stiff straw; a fine, round, red berry, and will yield nearly equal to the above; usual weight 60 to 62 lbs.

Other varieties are raised in different sections, where they are favorites.

I hear of no spring wheat being raised in the south-western part of this State.

The only serious enemy we have to contend with is the Hessian fly, and that has not troubled us much for the last two years.

The weevil has been very troublesome in some parts of the State, but I have not yet seen any signs of it here.

The rust is its most serious disease, and indeed a severe check to the cultivation of this grain. This year, from the estimates made, there will not be one-third the usual average crop in this State, which will be but little more than is required for seed and bread for the next year. In regard to changes in character, I find a marked difference in quality when raised on different soils, and experienced millers say that they can make from one to two pounds more flour from wheat raised on upland ground, than that from black bottom soil. We consider the medium between the high and low lands, on what is termed here *second bottom,* the best soil for this crop. I suppose the best wheat lands would be found in the south-eastern part of the State. Not one acre in ten of this crop has any manure applied. A summer fallow or corn ground, after that crop is taken off, is the usual custom, and sometimes two, or even three crops in succession, upon the same land. The common mode of using manure, is to put it on fallow ground and plough it in, when the grain is sown. The straw is very little valued, and often buried in the field, and is seldom taken into account as food for stock. Fourteen bushels, I think, would be the full average crop for this and the surrounding counties. This is also probably near the average of the State. The standard weight of wheat regulated by law is 60 lbs.

Oats.—This is considered a secondary crop in this part of the State. The varieties cultivated are the *common dwarf,* the *side oats* and the *Tartarian.* The first is not so productive as the other two, but stands up best through our summer storms. The second is most productive, but grows tall and is very liable to fall. The third is a new variety, introduced within a few years; it is liked, so far as known, from its stiff straw and large-sized

berry. The straw, from its softness, is preserved as food for stock. This grain is generally considered about ⅘ths the value of corn as food for stock, but is preferred for horses when the price ranges in the above proportion. Oats is a common forerunner of wheat, in which crop its deleterious effect upon the soil is shown disadvantageously. The standard weight of oats is 33 lbs.

Rye.—There are two varieties cultivated, designated as the *white* and *black rye.* It is principally sown on low rich soil which will not produce good wheat, and is quite a certain crop, yielding from 20 to 25 bushels per acre; but, from the low price it bears in proportion to wheat, it is not much raised. It is nearly all consumed in distilling, and but a small part ground for bread. Near towns, the straw is expected to pay the expense of threshing by hand.

Barley.—No new varieties of this grain have been introduced. Those in cultivation are the winter and common six-row. The first makes the heaviest grain, and yields from 25 to 40 bushels per acre. The second kind is mostly cultivated and most productive, though difficult to get in early enough in the spring to insure a good crop. The soil in this section seems to suit it very well. But little is used except for malting.

Maize.—There are numberless varieties of this grain in cultivation, mostly crosses between the *gourd-seed* and *small flint.* Our summers are not long enough for the first, but a large and later variety than the latter is preferred for this climate. We find by experience that this grain soon becomes acclimated, but by so doing it loses its character, either becoming larger or smaller, as the case may be. With good cultivation, our medium lands will produce from 50 to 75 bushels per acre, without the assistance of manures, but the average for the county will not exceed 40 bushels. It is generally ripe enough to cut up by the 15th or 20th of September. Our uplands produce the heaviest grain, though the bottoms yield larger stalks and ears. I have never seen any experiment to estimate the comparative value of the husk and blade, but have observed that sheep, if they have plenty, will often refuse the husk entirely, while cattle will eat the husks first, and then the blades. I have never tested their value in comparison with hay, but the common impression is that the same weight of blades, if gathered and cured in a proper manner, is more desirable for young stock or horses than the average quality of hay. Our pastures are too extensive in this country for much to be done in soiling, and I know of but few instances where it is followed. At the large milk establishment near Cincinnati, corn is considered the best plant for that purpose. We find that ground corn well repays the extra expense; and the profit of cooking is illustrated every day at our distilleries, where, after the process of distilling, the refuse is found to be equal to the grain in its raw state. The standard weight is 56 pounds. Our upland corn often overweighs, while that raised on black bottom land seldom exceeds 56 lbs. per bushel.

Hay.—We generally consider clover best for cattle, and timothy for horses; but most of our hay is mixed. Clover is chiefly raised for pasture or as a fertilizer, and timothy only raised pure when intended for market. Herds-grass and timothy are the common mixture for our natural meadows, where the first forms a solid turf and eradicates the natural grasses; and by feeding stock upon this, or heavy harrowing and sowing, timothy is introduced. The average of pure timothy per acre, I should say, does not exceed 25 to 30 hundred. I know of no experiments in irrigation having been made upon a large scale.

Peas are not cultivated to any extent in this part of the State. I think from experiments made that they are equal to corn for hogs, but horses and cattle will not eat them.

Root Crops.—Irish potatoes have always succeeded very well here, until within 2 or 3 years, since which time they have suffered much with the rot. The average in field culture does not much exceed 100 bushels per acre. The sweet potato requires a warmer soil and climate than we have here to succeed well. Turnips are made very uncertain by the fly and warm dry weather, at the proper time of sowing; they are not considered a regular crop, and very seldom fed to stock. Beets, carrots, mangold-wurtzel, artichokes, &c., are not raised as food for stock; and from an experiment with sugar-beets, where labor is so high and other fodder so cheap, they did not pay me for the expense of raising, and since then I have abandoned the culture of them.

Dairy Husbandry is not carried to any extent in this county, and your queries in regard to this I am unable to answer.

Horses and Mules.—Of the number in the State, I have not data from which to give an estimate. The average price of working horses with us I would give as high as $50, and of mules over three years old $60 to $65. Very few mules are used in farming, from the general objection to their peculiar qualifications, though they are undoubtedly cheaper than horses.

The market for mules for the last few years has been in the South. That for our horses, of which large numbers are driven off, is in the East.

We have heavy dealers in *Cattle* here. At three years old of common stock, they generally range from 15 to 20 dollars per head; if improved from $30 to $40.

Our cattle are driven to the eastern part of New York and Pennsylvania. Six dollars per annum is the usual estimate for feeding from 1 to 3 years old. The Durhams seem to be the favorites here, of which we have some very fine specimens, principally descended from the Scioto importations.

Sheep.—Wool-growing is quite a considerable branch of industry in this part of the State, there having been as much as 90,000 lbs. of wool bought in our county-town, and the clip of the county ranges from 75 to 80,000 lbs. per annum. Upon the common stock of the county has been crossed the Merino and Saxony, so that nearly all flocks show connection with these breeds.

The fleeces range from 2¼ lbs. on the Merino, and Saxony to 5 and 6 lbs.; on the large coarse sheep of the country, but 3 to 3½ lbs. is considered a very fair yield. The expenses of keeping sheep to those who arrange to have good winter pastures is very inconsiderable, only requiring food when the ground is covered with snow. Where regularly fed the expense is about 50 cents per head.

Hogs.—The average weight of hogs at 20 months or 2 years old, I should put down from 175 to 200 lbs. net. Fat hogs will lose about 20 per cent. of their live weight when dressed, and are no profit to the farmer near a market for this grain, under $2 50 per 100 lbs.

Excuse any mistakes in this report, as my experience in farming is not of many years standing; and I would be glad, if this gives satisfaction, at any time to serve the department in this way.

Yours truly,

J. MORRISON WARDER.

Hon. THOMAS EWBANK,

Com'r of Patents.

PLYMOUTH, WAYNE CO., MICH., *December 27th*, 1849.

SIR:—Your circulars have been received through the care of the Hon. R. M'Clelland, and Hon. A. W. Buell, and will be most cheerfully answered from the best information derived from inquiry and personal observation. As the culture of wheat constitutes the main agricultural business of Michigan, a few ideas may be advanced which are applicable thereto. Three important things in relation to it may first be considered, viz., climate, soil, and cultivation. A temperate climate is most conducive to its production; in extremely warm or cold regions it does not mature as well.

Clay, loam, and sand may be considered our principal soils, and a due mixture of these forms a fine ground for wheat.

In addition to these, *marl* and *alluvial* matter may occasionally be found in Michigan, and the soil is generally well charged with alkali, and lime gravel. On the *cultivation* of wheat much depends. The prudent farmer analyzes the quality of his soil by the best means within his reach, and should any of the elements be wanting, he endeavors as much as possible to supply the deficiency.

His low lands are drained and ridged, that the surplus water may pass off. The ridges should not exceed fifteen feet in width. On these lands there is usually a large growth of straw, but not so much wheat in proportion as on the more elevated lands. Those low grounds are generally considered best adapted to corn, oats, and grass; and the drainage contributes much to the healthiness of such locations. The lands of Michigan are usually undulating, and require but little draining.

The practice lately adopted of ploughing but once for a crop saves much labor in cultivation. By this method the vegetable substances which are to form the nourishment of the coming crop are turned under to a reasonable depth, and rolled down compactly, so that decomposition readily takes place. The process after rolling is to harrow the field over, using, if it can be obtained, the wheat cultivator, guaged so as not to turn up the furrow. Thus the land is prepared in fine order for the crop. The cultivator used by me is "Ide's Patent," manufactured in Western New York.

By this mode of culture, the nitrous substances do not escape by evaporation, as they did under the old soil-destroying system of ploughing a second and third time. To the above method I add the frequent use of clover, lime and plaster, of which my experience of nearly thirty years testifies the advantages, both in improving the land and the quantity and quality of the crops.

Among the many varieties in use, I prefer for seed the white, and almost transparent flint wheat. It is the most hardy kind, and being a bald wheat is easy to work with should it lodge. It fills well, does not shell much in harvesting, and will stand out in the open shock in stormy weather much longer than any other variety without injury. It is heavier per bushel, makes better flour, and generally yields more to the acre under the varied circumstances to which the wheat plant is subjected, than any other kind.

During the past twenty years, the average weight of my flint wheat has ranged from sixty to sixty-five pounds, and the yield has varied from fifteen to forty bushels per acre, depending on the soil, cultivation, and season.

My mode of preparing the seed is to place the given quantity on the barn floor, after being perfectly cleaned, the day before seeding, and saturate it well with a strong brine of salt and water, and on the day of seeding I wet

it again with brine, and roll it in equal parts of lime and plaster, and then sow at the rate of two bushels to the acre.

The time of seeding for the past thirty years has been from the 15th to the 25th of September, and my wheat has never suffered materially either from rust or the insect. Preparing the seed in this way gives the plant a fine growth in the fall, and a strong root to withstand the winter. It likewise has an early growth, so that the rust is not so apt to strike it. As the insect makes its appearance about the 20th of September, the wheat does not come up, when sown as above stated, until after the fly or insect has disappeared. It is a mistaken idea entertained by some farmers, that *shrunk* wheat is equally as good to sow as the plump berry. On the contrary, the seed should always be of the best kind, for it is a law of nature that *like produces like*, which is as true in the vegetable as the animal kingdom.

Our wheat crop is harvested from the 10th to the 25th of July. There is but little difference in the time of ripening of the following varieties, all of which are cultivated more or less in this section, viz., the velvet-bearded, the red-chaff bald, the crate, the club wheat, which has a remarkably stiff straw, the red-chaff bearded, the Mediterranean, which is not liable to be injured by the insect, the white-chaff bald, a very tender kind of wheat, with a brown berry, and very apt to shrink, the dwarf flint, the large white flint, and the transparent or crystal flint.

My practice in the application of manures is to put all the stable and straw manure on the *corn* and *oat lands*, where the weeds can be subdued; and the clover, plaster and lime upon the wheat fields, which are fallowed. A judicious system of rotation is also very beneficial, which must be regulated according to the best practical observation, varying the process according to the nature of the soil, the quantity of manure, and the help at hand, all of which should be taken into consideration. The cost of raising wheat will not vary materially from the estimates contained in the communications from me published in the Reports for 1847 and '48.

The aggregate crop of 1849 throughout this State compared with that of the previous year is a trifle higher, including the additional land now under cultivation.

Oats.—The oat crop is not considered a very profitable one by many of the farmers of Michigan; there are the following varieties produced: The small white oat, the mane or side oat, the barley oat, and the black oat. The two last-named varieties are usually preferred by farmers, and with me the black oat yields the best. When sown in April they generally ripen in August, depending somewhat upon the season. The weight of a bushel of oats by the statute is 32 pounds; and of corn 56 pounds. For feeding stock, or fattening hogs, the value of oats is much less than corn. One bushel of corn, ground and cooked, is worth more than a bushel and three pecks of oats prepared in the same manner. There is not this difference when fed to horses; as corn is rather too heavy and heating for them. A mixture of ground oats and corn, two bushels of oats to one of corn, wet with cut hay, or rye straw, makes an admirable feed for horses.

The cultivation of oats is becoming less popular, as it is thought to injure the soil for other crops.

Rye is not extensively grown in Michigan, from the fact that more wheat can be produced from the same field, and is a cash article, while the demand

for rye is limited. No new varieties have, to my knowledge, been introduced into the State.

Corn.—The *dent* variety in dry seasons produces the best on sandy loam, as its roots run deeper than the common *eight-rowed* yellow or white. In moist seasons, the latter varieties usually do well. They are grown more generally in the northern part of the State, while in the southern section the Ohio dent is principally raised. The shuck and blade are much used as fodder for cattle, in the early part of winter.

Corn is very liable to change of character from soil and climate, growing smaller the farther North it is raised. The mixing of the *eight-rowed yellow* with the *Ohio dent* has, so far as my experience goes, been beneficial in increasing the yield. Sandy loam or clay is considered the soil best adapted to corn. We usually plant in May, and harvest in September. The blade is not taken off here as at the South; some farmers cut up their corn when ripe, put it into shocks, and husk it late in the fall; others cut the stalks, bind them in sheaves, and stack them for winter in the fields, or put them away in barns or sheds; while others husk the corn on the hill without cutting the stalks, and late in the fall turn their cattle into the field to eat the fodder. Of these different modes, the preference is usually given to cutting the stalks and putting them under cover after being well cured, and husking the corn on the hill. The corn is thought to ripen better in this way, and to keep better in the cribs. The *Ohio dent*, having a smaller ear containing less moisture than other varieties, ripens quicker and keeps better.

The following estimates of the cost of raising the above crops will not vary far from the average in our new State, where the grubs and roots have first to be subdued, before the land will be fitted for any new or improved method of ploughing and cultivating.

The cost of new land and preparing it for the crop is about ten dollars per acre:—

Wheat.

Interest on land, $10 per acre—2 years,	$1 20
Ploughing and sowing,	4 00
Seed, 1½ bushels per acre,	1 20
Harvesting,	1 50
Threshing, cleaning, and marketing,	1 50
Cost of crop per acre, averaging 18 bushels,	$9 40
Cost per bushel, about	52 cts.

Corn.

Interest on land,	60
Ploughing and harrowing,	1 50
Furrowing, planting, seed and plaster,	1 50
Cultivating, hoeing, &c.,	2 00
Harvesting, shelling, and securing fodder,	2 25
Cost of crop per acre, averaging 40 bushels,	$7 85
Cost per bushel, about	19½ cts.

(The fodder will pay for marketing.)

Oats.

Interest on land,	60
Ploughing per acre,	1 50
Seed, 2 bushels,	50
Sowing and harrowing,	50
Husking, threshing, and marketing,	2 00
Cost of crop averaging 35 bushels,	$5 10
Cost per bushel, about	$14\frac{1}{2}$ cts.

Potatoes.—The crop this season is better than it has been for 3 years past, although it has suffered somewhat from the disease. About the 20th of August, the first appearance of disease was observed on the vines, the tender leaves of which seemed to be stung by a small fly or bug, and immediately wilted; the disease spreading quickly over the whole vine, and thence downward to the potato itself. I am satisfied that there is an insect that affects the potato vines, which is of recent origin, and somewhat similar to the wheat fly. A neighbor of mine prevented the spread of the disease over a part of his field by sprinkling slaked lime on the vines when the insect first appeared; he also rolled the seed potatoes in lime after having cut them to plant. I think that sprinkling lime on the tops, say one bushel to the acre, is a much better preventive to the disease than cutting off the vines, as is often done about the middle of August.

Hay.—Timothy is preferred to clover hay. *Red-top* and *blue-joint* are next best for cattle; but for all kinds of stock a mixture of timothy and clover is by far preferable. For enriching the land clover is very valuable; its long tap roots bring up from sub-soil many of the elements which will serve as food for the future crop. On the natural meadows and prairies of Michigan, there is an abundance of wild grass which is of incalculable benefit to the emigrant, furnishing pasture and hay for his stock. To the early settlers these prairies are more available than the wheat lands; providing them with milk, butter and cheese, and the means of fattening pork, beef and mutton. The average yield of wild hay is about one ton per acre. *Tame hay*, so called, on timbered lands yields from one to two tons. The former is worth $2 to $3, and the latter $5 to $8 per ton.

Peas are cultivated both for enriching the land and for fattening hogs. We sow 2 or 3 bushels to the acre, and harvest them in August; and then plough the land once and put in wheat. In this way the land is as well fitted for wheat as if fallowed; but this plan is not generally followed, as many farmers prefer the corn to the pea crop.

Cattle and Horses are raised in all parts of the State. The price of 3 year old cattle varies from $10 to $15. We have the Devon, Durham, and Holderness, and the native breeds. The former sell much higher than the above prices. The cost of keeping on the prairies is but trifling. Our market has been at home to supply emigrants, until lately; now many are driven off and shipped to eastern cities. On new land oxen are principally used for breaking up, and sell at from $50 to $100 per yoke. Cows are worth from 10 to $20 each, and horses from $100 to $200 per pair.

Sheep.—The prevailing races are native, although many good flocks of Merino, Saxony, and lately of a superior breed, called *French all-wooled Merino*, have been introduced; the weight of the fleeces of the last-named breed is said to be 10 pounds; the common Merino 3 lbs.; the Saxony $2\frac{1}{2}$

lbs., and the native from 3 to 4 lbs. The Leicester and Southdowns are a more hardy race, and make better mutton. Our State is well adapted to raising sheep, and increased attention is being paid to this branch of husbandry.

Orchards.—Great pains and care are taken to select fruit trees, such as apples, pears, peaches, &c., as fast as the land can be prepared for that purpose. With me the most successful method has been to dig a hole from four to six feet in diameter, and about two feet deep, and fill it half full of warm rich earth. I then wet the roots of the tree, set it and fill around as compactly as possible with the same rich soil. Wetting the roots of the tree causes the dirt to adhere more closely to them, and is better than pouring in water, which often makes the ground crack and admit the air. The orchard may be cultivated with corn or potatoes, but oats or clover should never be grown.

Above I have endeavored to give a few ideas as to the method and progress of agriculture in our young and growing State. If these hints shall be deemed worthy of an insertion, I shall consider it a privilege to add my mite to the useful reports of your office, which contain volumes of information of much practical value to the farmers of the country.

Respectfully your ob't serv't,

JONATHAN SHEARER.

Hon. THOMAS EWBANK,
Comm'r of Patents.

MOSCOW, HILLSDALE CO., MICH., *December* 22*d*, 1849.

DEAR SIR:—Your circular calling for the statistics for 1849 was duly received and would have been answered before, had I not delayed to collect information from the assessor's returns for the county. My experience in the culture and raising of wheat is as follows. The *white flint* has proved to be the best variety. The *Soules*, *Hutchinson*, and *White Flint* do not vary much in time of ripening (about 8th July) or in weight. The *Mediterranean* wheat ripens about ten days earlier than the other varieties mentioned. The Hessian fly is the greatest enemy to the wheat crop in this section. The *Mediterranean* has been recommended to farmers as free from the ravages of this insect; but here it has proved otherwise—and this being coarse, dark-colored wheat, I do not consider it a valuable variety.

Our soil is well adapted to wheat, being a mixture of sand, gravel, and loam, highly impregnated with lime. In the course of the last nine years, from 1841 to '49 inclusive, I have cultivated fifteen hundred acres in wheat, which have produced twenty-two thousand five hundred bushels, an average of fifteen bushels per acre. The price at my barn has averaged seventy cents per bushel; the cost of raising forty-five cents, including interest on land estimated at ten dollars per acre.

Corn.—The *yellow dent* is esteemed the best variety for this soil and climate. The usual time of ripening is about the 1st of Sept. This crop ranges from 25 to 65 bushels per acre, and the difference in the yield is to be attributed to the manner of cultivation. My experience shows that a crop of 45 bushels per acre costs 13 cents a bushel, including interest on land. Corn is principally raised in this vicinity for home consumption, and the stalks and shucks, if well cured, are worth $3 per acre, compared with hay at $5 per ton. I consider green corn for soiling cattle and producing

milk preferable to any other green food at that season of the year. I have tried some experiments in feeding corn ground and cooked; and I consider *two* bushels ground equal to *three* fed whole; and for fattening hogs, if ground and cooked, it is worth double as much as if fed whole and raw.

Hay.—I think timothy hay is worth 50 per cent. more than clover for all stock; clover is better for horses and sheep than for cattle. I get a better crop of timothy by sowing clover with it; our soil is too quick and warm for timothy alone. The average yield in this vicinity is from one to one and a half tons per acre.

Root Crops.—Not much attention has been paid to the culture of these, except Irish potatoes, and they are only cultivated for home consumption. The quality is of the very best, and the average yield is about 150 bushels per acre. They have not been injured so much this year as last by the rot. I estimate about 15 per cent. as the loss from the disease this year.

Sugar.—The amount of maple sugar manufactured in this county the past year is 157,459 pounds. Allowing this county as the average throughout the State, the amount of sugar manufactured in this State will be over 4 millions of pounds during the past year.

Horned Cattle.—The whole number in the State will not vary much from 350,000. Average price at 3 years old $12. Markets, Ohio and New York. The cost of keeping per year $5 per head. In consequence of an inferior breed, and the little attention paid to improvement, the cost of keeping exceeds the market value. This loss in raising cattle will be turned into profit, when the farmers turn their attention to the improvement of the breed generally throughout the State. I find no difficulty in making my cattle worth, at the age above specified, $20 per head. There have been some few improved cattle lately introduced into different parts of the State, principally Durhams and Devons. I prefer the latter, and have a stock of pure-blooded Devons, which when crossed with our common breeds increase their value fifty per cent.

Sheep.—The prevailing race is the common coarse-wooled sheep; and the average weight of fleece of this grade is about 2½ lbs. Pure-blooded Merinos will yield about 3½lbs., and with extra care and keeping 4 lbs. I have a flock of one thousand, and find the Merino to be the most healthy and hardy of any breed. The pure *Escurial* I consider preferable to the *Paular*, or any other of the Merino race. Wool-growing in this State is rapidly increasing, and those who are giving it proper attention are reaping rich rewards, compared with those who confine themselves to the great staple, wheat. Prices of wool ranged last year from 25 to 35 cents per lb. Our markets are New York and the Eastern States. The cost of keeping per year is about sixty cents per head.

Hogs.—Average weight at 18 months old 250 lbs. When well fattened, deduct one-fifth from live weight to obtain the net. The cost of fattening, as most farmers do it on raw corn and in open yards, $3 per hundred weight. If the corn be ground and cooked, and there are good arrangements for feeding, at least 50 per cent. will be saved.

Plaster.—This is used sparingly in this part of the State; cost $10 to $12 per ton. It is very beneficial to clover and pastures; and I find from experience that 25 pounds per acre is worth as much for one year as a larger quantity. By sowing plaster as above, I have increased the crop of clover and timothy from ¾ of a ton to 2 tons per acre.

Orchards and Fruits.—We have many young orchards just beginning to

bear fruit. Much pains have been taken of late by our farmers to procure the best varieties. Peaches, plums and pears are cultivated with good success. Our fruit-growers have also given much attention to the grape. A neighbor of mine, Mr. O. C. Gale, has raised during the past season two bushels from a vine only three years old. This is the Catawba, a variety much esteemed by most people in this vicinity.

The statistics of this (Hillsdale) county, required by law to be taken by the assessors, are as follows:—

Wheat, number of bushels	207,000
" average " per acre	10
Wool, number of pounds	66,456
Maple sugar, number of pounds	157,459
Horses, number	1,713
Neat cattle, number	8,436
Swine, number	6,534
Sheep, number	24,321

If the above information will be of any benefit to you, or the agricultural interests of our country, I shall feel myself amply paid for the little time I have devoted to the subject in this communication.

With sentiments of high respect,

I remain yours,

O. B. BLACKMAR.

Hon. Thos. Ewbank,
Com'r of Patents.

Adrian, *Michigan*, *December*, 1849.

Sir:—Your circular was handed me some time ago, by Judge Potter, with a request that I would reply to such of its questions as I thought best.

My residence, until a few weeks past, has been in North-Western Ohio since 1830; my knowledge of that section is therefore greater than of Southern Michigan, my present residence.

I shall only touch those matters with which I am most familiar.

Labor.—The most common labor with board is worth from $50 to $75 a-year. A higher quality, in which some care and responsibility are added, is worth $100 to $120. When hired by the day 75 cents in summer, and 50 cents in winter, with board, is about the average; without board 20 cents should be added. The cost of boarding a laborer is from $1 to $1 50 per week. A large proportion of the laborers are German and Irish.

Plaster and other Fertilizers.—These are used to some extent, but much less than the interest of farmers require. I notice that about four times as much plaster was sent up the canal from Toledo this year, as went up last year. The quantity forwarded into the interior of Michigan by the railroad from the same place, is also rapidly increasing.

The Onondaga plaster, shipped by way of Oswego, is principally used. It costs at Toledo and Monroe one dollar per barrel; equal to about 6 dollars per ton. I have used it on sand and clay land with decidedly beneficial results. When applied to grass, I have used leached ashes with it, putting on 100 bushels of ashes to one of plaster. This application, with a moderate supply of horse-dung, gave me crops on a light sandy soil that astonished all who knew the previous poor products of the same land. I took yearly, for 3 years in succession, three full crops of clover and timothy

from a soil far from naturally fertile, being of that kind known as yellow-sand. I have also used plaster on corn and potatoes with good results. For potatoes, I at first put on too much ashes, perhaps at the rate of 200 bushels to the acre.

There are beds of gypsum on Sandusky Bay and on Grand River, in Michigan. It is brought from both places to the ports along the lake, and many persons prefer the white Sandusky and Grand River to the Onondaga, which is gray. I have used both the Sandusky and the Onondaga, without being able to say which is best. Both are nearly enough the pure sulphate of lime.

In regard to common *lime*, very little use has been made of it as a fertilizer in North-Western Ohio and Southern Michigan. It enters so largely into the composition of the clay of all that region, and in many places of the loamy soils, that its application is scarcely needed. In considerable districts, where the top soil is a sandy loam, a sub-soil of clay so calcareous as to effervesce with acids is found a few inches below the surface. A sub-soil plough will generally bring enough marly clay to the surface to mix with the soil. This whole region is underlaid with lime rock, which crops out in many places.

On the cultivation of the vine, I have had a rather wide personal experience. Before 1820, I witnessed a growth of foreign grapes trained on small forest trees, in the ground of the lady of Gov. Milledge, of Augusta, Georgia.

These were said to do better than any which had been trained after the European fashion. From that time to the present, I have seen the failure in almost all the climates of our country, of all attempts to raise the foreign grape in the open air. For a short time the *Black Hamburg* and some other varieties bore good crops in the Southern States. Several gentlemen in South Carolina and Georgia spent much money and labor in efforts to make successful the cultivation of foreign grapes in vineyards. Mr. Herbemont, of Columbia, South Carolina, was particularly noted for his hopeful labors in that field. When I first saw his vineyard (in 1826) it contained some 15 acres, embracing a great variety of foreign grapes. The kind called by him *Sicily-Madeira* was, according to my recollection, the best bearer. Long experience finally satisfied Mr. H. that he must rely on the native grape for such crops as would be profitable for wine and the table. A similar experience has been gone through in Ohio and Indiana, with like results. Seedlings from foreign grapes, the *Isabella*, the *Catawba*, *Lenoir*, &c., have been cultivated with success. For 10 years I have cultivated a grape which proved to be the *Clinton* of New York; it was bought of a nurseryman for the Isabella. The two kinds have since been cultivated together. Of these, the Clinton has proved the more profitable; being a far more hardy vine, and an earlier bearer. Both kinds rotted a little last summer for the first time, but not enough to prevent the maturing of a heavy crop. The severe frost and open winter of this climate often occasion the destruction of the previous year's growth of the Isabella. The Clinton is never injured. The Clinton ripens a week earlier than the Isabella. I have tried neither kind for wine. Last autumn a friend took some of the Clinton from me to be made into wine, as an experiment; being less pulpy than the Isabella, it would turn out more juice. It is the impression that it will be the best wine grape of this climate.

The Catawba grows pretty well here, but is rather late in ripening. The

vine is more hardy than the Isabella, not being liable to be winter-killed to the same extent. On the Ohio river, it appears to be the best grape, both for wine and the table. I know of no reason why wine may not be made of the Catawba and Clinton grape in quantity equal to the home demand for ordinary wines. Both kinds grow with great luxuriance on rich soil; they appear to grow equally well on rich clays and sandy loams. Both are gross feeders and capable of bearing, without injury, very high manuring.

As a dried fruit, the Clinton grape is excellent; it requires little labor or care in drying. Last year we strung the bunches when ripe, and hung them up in a large garret, where they dried, after their own fashion, very well. In the spring we were delighted to find them the best dried fruit, both for eating uncooked, and for cooking, that we had any acquaintance with. This year we have used them for pie-making, and find them very good. We have put down both the Isabella and the Clinton in cotton-batting, and kept them fresh until February, in a cold garret. The Clinton appears to keep in that way better than the Isabella. It appears to me that dried grapes might be brought into extensive use, and be made to take the place of imported dried fruits, as the currant, &c. For fall and winter use, the grape is preserved fresh, about as easily as apples; they scarcely rot as much. Cotton is the best material to pack them in; a layer of cotton and a layer of grapes alternately—the bottom, sides and top of the cask being also well lined with cotton.

When eaten in January and February they were thought better than when taken just ripe from the vine.

As to the mode of training, I have used all with equal success. Vines should have room enough. They must not be pruned in European fashion. I believe they should have no summer pruning. They should be allowed to run extensively, when the root is large and in rich ground. I would allow them four or five times the extent which European cultivators recommend. The yearly pruning in February should be done with a bold knife. Beginners always leave too much of the last year's growth; I mean after the vines have attained sufficient length.

Mr. John S. Skinner, Maj. Adlum, Messrs. Herbemont, Longworth and others, deserve the lasting gratitude of the whole country for their efforts, finally approaching success, in promoting the cultivation of the vine.

That your labors to promote this and all other branches of industry, called for by the present condition of the country, may be crowned with success, and equally redound to your honor, and the benefit of the country, is the ardent desire of

Your ob't serv't,
J. W. SCOTT.

Hon. Thomas Ewbank,
Commissioner of Patents.

Prairie du Chien, Wisconsin, *Dec.* 3d, 1849.

Sir:—Your valuable report for the year 1848 having a few days since fallen into my hands, my attention was particularly called to the subject of planting, and the remarks as to the *time* of doing so in different sections of our extended country, together with the time of ripening, harvesting, &c. (page 108). Not noticing anything in reference to the country north of this place, and along the Mississippi and Lake Superior, a country

with which I have been somewhat familiar for several years past, it occurred to me as possible that some account of this region would be acceptable if not desirable, relative to climate, crops, &c.

And *first* as to the season of planting Indian corn. In 1836, when I settled with my family at this place, Col., now Gen. Taylor, was in command of this post (Fort Crawford), and had for many years in addition to his military duties attended somewhat to agriculture—not of course from necessity, but from his constitutional inclination to be doing something useful to the world and his fellow-men. His example no doubt contributed greatly towards improving the mode of cultivating the soil at this place, by the Canadian French who were then the only farmers here.

The Gen'l, as you know, was from Kentucky, where corn is planted in April, and of course would naturally think *that* the proper time to do so; but he informed me, as the result of his experience, I think some 15 years, that from the 10th to the 15th of May was early enough to avoid the late spring frosts, which usually come from the 15th to the 20th of that month; and in the 13 years of my residence here, I have found his views to be correct, and have even seen corn ripen which was planted on the first week in June.

As to other grains, spring wheat, oats, barley, peas, &c., they are often sown in April. Our winters here usually break up in March, and the plough is started by 20th of March, and from that to the first of April. We have had but one spring of the thirteen I have been here, when snow and ice would prevent ploughing by the 1st of April.

North of this, of course, the time of planting is proportionally later. In Minnesota, planting is often done as late as the 15th to the 20th of May, and even to the first week in June. In the spring of 1837, as a missionary to the Dakotah Indians, I planted corn on the 24th of May, some seven miles from Fort Snelling, and on the 1st of June, it was up two inches high, while in some of the ravines facing the north, the ice which had formed from springs to a considerable thickness, by overflowing, was still visible nearly opposite where St. Paul now stands; and as far north as Sandy Lake, Lake Superior, and the North Red River, Red Lake, Leech Lake, &c., the 1st of June would be sufficiently early for planting.

Secondly: You seem to infer from the lateness of the season of planting that there must be a corresponding lateness in ripening and harvesting. This however is a mistake, for two reasons:—

(1.) In this northern region we plant a kind of corn different from that grown farther South; a kind which matures sooner. The southern gourd-seed would not ripen here at all; every attempt to raise it has failed; nor do we use the New England 8-rowed flint corn. We use a kind peculiar to the country, which seems to have come from the gourd-seed by acclimation; having been removed by degrees to the north, and being affected by the seasons (of which I shall soon speak,) it has accommodated itself to the climate in which it grows. The kernel is less dented, about half as long, and the meal sweeter and more nutritious than the gourd-seed. The stalk is about half the height of the gourd-seed, the corn about the same length, and the cob about the same size; but the diameter of the ear is less, owing to the difference in the length of the kernel.

The corn raised near the northern lakes and rivers is of a still different kind; the seed of which was obtained from the Indians, who raise it in considerable quantities. This Indian corn seldom grows over 4 feet high; the ears

set near the ground, several on a stock, and are small. The kernel is sweet, and it matures in about 6 or 8 weeks from planting. I have had it on the table in six weeks after planting, as far south as this. This corn has frequently yielded 50 bushels to the acre.

The corn I speak of, as peculiar to this country, and as coming by degrees from the South, will probably average 50, and has sometimes yielded 70 to 90 bushels to the acre. One kind of it was from Kentucky, called *white hominy corn*, which was brought to this country and acclimated by the late Thomas P. Barnett, Esq., some 15 years since.

(2.) Another reason why our crops are not proportionably late in ripening, is the greater rapidity of the growth of vegetation as we go north. Nature seems to have provided for this; so that in latitudes where the seasons are short the growth of vegetation is the more rapid.

On the 27th of June, 1838, at the falls of St. Anthony, I saw corn in the tassel, and potatoes in the blow, while strawberries were at full maturity all over the plains. On the 4th July, of the same year, at the Little Falls, a few miles below, where Fort Gaines now stands, I also saw potatoes in bloom, while the wild grapes had attained their full height and were preparing to seed. About the middle of July, 1843, I saw wheat late sowed, ready for the sickle, at La Pointe, on Lake Superior, while potatoes and other garden vegetables were beginning to show themselves on the table. And about the 2d of July, 1846, I saw as large and fine-flavored potatoes on the table, at the mouth of St. Croix, as I ever eat, while the spring wheat and oats were being harvested.

Of the climate in this region of the country, you may form an opinion, from the fact that we have raised sweet potatoes of good size at this place; and a few years since I raised cotton from seed brought from New Orleans, in which the fibrous wool was perfect, but the seed did not ripen. Of the products of the country, we may say that our corn crops do not average equal to a more southern climate; but, in wheat, rye, oats, barley, peas, &c., we can hardly be beaten. One of my neighbors, Joseph Atherton, Esq., two years since, harvested 55 bushels of winter wheat from an acre. The year before, on less favorable ground, Judge Lockwood harvested 40 bushels per acre. Our average crop, however, is about 30 bushels of that kind of grain. I have seen a field that yielded 90 bushels of oats to the acre, though 60 is considered an average crop. Our winters here, in 43° N. latitude, are not more severe than in 41° in New England; and being less subject to change, are endured with much more comfort. We have had no snow since the 20th of March last, and no freezing yet to impede the out-door business of the country. But it is usual for our winters to set in about the 20th, to the 26th of November. When winter sets in, it usually increases in coldness gradually, till about the 20th of February, when the thermometer sinks to 24° below zero, and in a few instances to 30°, and in one case to 36°; but this only for a few days, when immediately after the winter breaks, and generally by the 20th of March the plough commences its operations.

Whether these facts will be new, or of any use to you, is for you to determine; if they are, you can make use of them at your pleasure. They would have been communicated sooner, but for the reason first stated, that it is but a few days since your Report for 1848 fell into my hands, and as you there intimated that you were obliged, under the existing laws, to wait till

the close of the year before you can make your annual report, I hope, if this is of any use, it will not be too late.

Respectfully your ob't servant,

ALFRED BRUNSON.

Hon. Thomas Ewbank,
Comm'r of Patents.

Fond du Lac, Wisconsin, *Nov.* 20*th*, 1849.

Sir:—Your circular addressed to me as President of the State Agricultural Society of Wisconsin was duly received.

I am sorry that I cannot give you more information in reply to your pertinent and important inquiries, as I have not preserved the necessary statistics. I am glad these "circulars" have been issued to suggest to the country, as they have to me, the importance of doing so.

I could speak on several topics enumerated in the list of your inquiries; but it would be only to multiply words without instruction; I therefore forbear.

In regard to "sheep husbandry," I will say a few words, prefacing that I am more acquainted with this branch of business, and that I am a breeder of Paular-Merino sheep.

I will answer your inquiries under that head.

1. "What are the prevailing races?"

Answer.—Merino, Saxon, and native—not many pure or full-blood of either sort. The Merino predominate. The Saxon are not considered sufficiently hardy for our climate.

2d. "What is the condition of this branch of industry?"

Ans.—Just beginning to attend to it—of necessity farmers must get some few years' start with their improvements before it is proper or profitable to introduce sheep. It is just the time now for the farmers of Wisconsin to turn their attention to sheep, *and they know it.*

3d. "What is the amount of wool clipped in the year, and average weight of fleece of different races?"

Ans.—I cannot tell the amount of wool clipped in the year in this State. The "average weight" of the fleeces of the "races" *mixed as they are*, is between three and four pounds. My Paular-Merino bucks shear from nine to thirteen pounds—ewes five and six. I think a flock of Paular-Merino sheep may be made to average six pounds.

4th. "What is the cost of keeping sheep through the year per head?"

Ans.—The cost per head (exclusive of labor for tending and shearing) is about forty cents a-year.

5th. "Where are your markets?"

Ans.—There are a few wool-buyers every year in the large towns on Lake Michigan; but most of the wool, I apprehend, from this State, is sent to Peters' Depot at Buffalo. This answers your other questions as to "system of selling," and in part answers the following:—

6th. "Have you wool depots, and are they found advantageous for the wool-grower and manufacturer?"

Ans.—I think that wool depots are of great advantage, both to the wool-grower and manufacturer, or at all events, that they may be made so. Doubtless some improvements may be made in the system. After all, it will be

liable to abuses; but it is the best, I think, at present devised, and, honestly and fairly carried out, may be made of great use to the country.

7th. "What number of sheep are killed by dogs in your State?"

Ans.—Dogs trouble us but very little in this State; and the same may be said in regard to wolves, which answers another inquiry that I have often heard made.

One word as to prices paid for wool. The wool that was purchased by buyers in this State was generally bought for about 25 cents per pound. I sent mine to Peters' wool depot at Buffalo, and it was sold for *thirty-six* (36) cents per pound; all except some of the finest quality, which brought sixty cents per pound. The expense of transportation was about fifty cents per hundred weight.

I will make another remark, as it bears upon the question of the utility of wool depots, as well as on the subject of our western markets.

Wool of the same quality as mine which brought thirty-six cents at the depot, that is, wool shorn from the flocks of sheep, from which my own sheep were selected, was sold in Vermont this year (not at a wool depot) for thirty-three cents per pound, and this tends to show another thing; to wit, that there is no foundation for the foolish notion entertained by some that the wool on sheep brought to the West will grow coarser if they remain here. In other words, it shows that we can raise fine wool in the West as well as anywhere.

Hoping that your forthcoming report may be of great use to the country,

I am, sir, very respectfully,

Your ob't servant,

ERASTUS W. DRURY.

Hon. Thomas Ewbank,
Com'r of Patents.

Washington, D. C., *November* 15*th*, 1849.

Sir:—In compliance with your request, I embrace the opportunity of giving you such general information as I am in possession of in relation to the productions and improvements of the Southern portion of Indiana and Illinois.

It will be impossible to furnish any reliable statistics of the exports. The most I can do, is to compare the present with former years, with a view of showing the excess or deficit.

The articles for exportation consist of corn, pork, wheat, flaxseed, tobacco, hay, flour, kiln-dried corn meal, buckwheat flour, whisky, potatoes, green and dried fruit, castor oil, beeswax, wool, cattle, horses and sheep.

The principal staples, however, are corn and pork. The average productions of which will be thirty per cent. over any former year. But two varieties of corn are cultivated to any extent, white and yellow. Pure yellow yields equal to any other, always finds a ready market, and commands better prices. The medium price is twenty cents per bushel, shelled and sacked, the purchaser furnishing the sacks. More cultivators fall short of 50 bushels per acre, than exceed that quantity.

The price of pork will vary from \$1 50 to \$2 50 per 100 lbs. net, depending upon the weight of the hog, 200 lbs. and upwards commanding \$2 50 per 100 lbs., while under that size it will range as low as the minimum price. Oak mast has been unusually abundant, and a large quantity of pork

will be made without any attention from the owner; but mast-made pork is 25 per cent. below that made exclusively from corn.

Wheat is cultivated extensively, but is a very precarious crop. This year, as far north as the National road, it has almost entirely failed. A full average price is fifty cents per bushel for wheat weighing 60 lbs. the bushel measure.

Flax is raised to some extent by our farmers. It does not seem to be well adapted to our soil. Many cultivate it exclusively for the seed.

Tobacco is not an article of general culture. In a few counties it forms the main staple: the quality is excellent and the quantity exceeds that of last year.

There has been a failure of all kinds of fruit, particularly apples and peaches. Where apples sold last year for 10 cents per bushel, they now readily command from 50 to 75 cents.

All kinds of root crops are excellent. Potatoes, I believe, are exempt from disease, and have yielded 25 per cent. more than last year.

The hay crop, with the exception of clover, will be 50 per cent. below the growth of 1848. This is owing to the visitation of the army worm in the month of May, and the drouth which immediately succeeded.

Considerable kiln-dried corn meal was exported in 1848, but the returns have been unfavorable.

But little flour will be exported this year.

It would be difficult to estimate the quantity of whisky exported. The county of Perry alone manufactures 300,000 gallons, nearly all for the New Orleans market.

Castor oil is manufactured extensively at Albion, Edwards County, Illinois. Perhaps 100 bbls. would be a fair estimate of the quantity turned out yearly at that place.

The quantity of wool exported has greatly fallen off within a few years past. The climate and soil seem well adapted to wool growing.

Great numbers of horses are taken to the St. Louis and New Orleans markets from this part of the country; the principal objection to them is on the score of size; our farmers have too generally encouraged the breeding of light horses.

More attention has been given to rearing stock, and our farmers have taken considerable pains to improve the breed of cattle in Indiana and Illinois. Not a few have gone to the expense of importing from Europe the best animals to be had there. Large exports of beeves are made to New Orleans.

Emigration to this section of country is chiefly confined to the Germans, who are devoted to agricultural pursuits, of sober and industrious habits, and become valuable citizens.

They have introduced the culture of the grape in many of their settlements, two varieties of which are grown with success; the Catawba and Isabella. The former is esteemed the best bearer—it is a good table grape, and makes an excellent wine. I have known a net profit of $500 realized from half an acre of the Catawba, for table use.

Wherever the experiment has been made with the native vine, it has proved more lucrative than any other crop requiring the same space and labor.

A silk factory has been put in operation at New Harmony, Indiana, and

the fabrics from cocoons made there will compare favorably with the products of English looms.

The expense of transporting produce at any considerable distance from navigable streams, and the disproportion of prices when a few miles of overland transportation has to be made, have aroused our citizens to the importance and utility of internal improvements.

A plank road is now under contract from Mount Vernon to New Harmony, Indiana, a distance of fourteen miles; the estimates are about $1,800 per mile. Another is contemplated from Evansville to New Harmony, a distance of 26 miles, which will probably be put under contract in the spring. It is further proposed to extend this road across the State of Illinois to St. Louis, Mo. Wherever plank roads have been put in operation, they have proved profitable investments; indeed they pay better than any others, and are emphatically the roads for the farmer.

Respectfully yours,
LYMAN D. STICKNEY.

FRANKLIN CO., INDIANA, *Jan.* 12*th*, 1850.

Indian Corn is raised by almost every farmer, and by many in large quantities. More dependence is placed upon it as a source of revenue than upon any other one article; or indeed, I might with propriety say, than on wheat, oats, and barley, all combined.

A considerable quantity of the corn thus raised is consumed by distilleries, yet the larger portion by far is fed to hogs, which are principally driven to the Cincinnati markets. I presume the average yield of corn in this portion of Indiana will not vary much from thirty-five bushels per acre; and I should judge the average cost of raising about sixteen cents per bushel. The last year's crop will fall rather below an average crop, in my estimation.

Present price 25 cents per bushel at Brookville; at which place some thirty-five or forty thousand bushels have found a market within the last two months. Wheat comes in next to corn as a staple for market, yet the income arising from it falls far short of that from corn, and the crop is much more uncertain.

In the early settlement of the country, the farmers were reduced to the necessity of seeding among their corn, which at that time gave a reasonable reward for their labor; but as the land becomes reduced (as it naturally must by such management), the return for the farmer's labor must diminish; and until the practice of seeding among corn be done away with, the average quantity of wheat raised per acre must be low. I think that about 12 bushels may be set down as the average yield, and that at a cost of fifty cents per bushel. The wheat crop of last year proved almost an entire failure in many parts of Franklin and the adjoining counties, in consequence of the *rust*, which made its appearance some two weeks previous to the usual time of harvesting. Never within my recollection was the prospect more flattering for an abundant crop of wheat than it was until the appearance of the rust, which truly caused a great disappointment with the farmers.

Oats are raised in considerable quantities of late years, and form quite

an article for market. It is considered by most persons a hard crop on land, yet notwithstanding that the quantity raised will increase materially.

My impression is that the oat crop of last year will hardly average with a few years previous; either in quantity or quality. Common average about 30 bushels per acre; and cost of raising, perhaps 15 cents per bushel.

Barley was grown a few years since by many of the farmers, and formed something of an article for market; but its culture is being neglected of late in this section of country, and the deficiency measurably supplied from other States. Spring barley mostly raised in Indiana, which at best is an uncertain crop; and it apparently becomes more so every year, which has been discouraging to the farmers, and almost caused its disappearance from amongst us.

Root Crops.—There is but little account made of root crops, except potatoes, which are cultivated by almost every farmer, in small quantities; designed chiefly for table use. Some few persons turn their attention to the culture of Irish potatoes for market, but I think they form a very limited article in the food of stock. In the early settlement of the country, the growth of almost everything put in the ground was luxuriant, which created the impression on the minds of the early settlers that the labor of removing manure was unnecessary. Some were seen removing their stables, rather than be at the expense and trouble of scattering the manure on their farms. It is natural to suppose many of the descendants of those early settlers inherited the impression of their ancestors; and to this day the great advantages resulting from the judicious application of all manures, which naturally accumulate on all farms, is almost lost sight of.

My impression is, that where land is cheap and labor high (as is the case here), it will not justify the expense that many of the New England farmers incur in manuring their lands; yet at the same time, our lands may be much improved by careful and proper management; and it should be the object of every farmer to apply all manures at his command on the poor portion of his farm, depending principally on *red clover* and *timothy* as fertilizers. I have both tested and witnessed the beneficial effects resulting from the cultivation of red clover. As a fertilizer, it is certainly ahead of any other kind of grass, leaving the ground in delightful order, either for corn or wheat, and, indeed, preparing it with that necessary to the growth of almost any crop. I am aware that strong prejudices exist in the minds of many persons against red clover, for two reasons: first, because the worms are so apt to destroy corn planted immediately after the clover crop; and second, because cattle frequently die when first turned on it in the spring.

In answer to the first objection, I would remark that for years I have been experimenting upon the subject, and have come to the conclusion that fall or winter ploughing is almost a sure antidote to the ravages of the worms. Some three years since, I made my arrangements to put two fields in corn, side by side; the one was in clover, and the other in timothy.

I sought opportunity to plough my ground in the winter, but failed in my purpose, except to break up a narrow strip of dry land, which passed through the middle of each field. In the spring I prepared the balance of my ground, and planted it in corn; the result of which was, that portion of corn planted on the ground broken up in the spring was utterly destroyed; whilst the part planted on the ground which was ploughed in the winter remained unharmed.

I have also experimented some upon the subject of grazing cattle upon clover, which has been entirely safe and satisfactory to me. My experience has demonstrated that cattle should never be turned in the field without being well fed, nor before the dew is off in the morning, for a few of the first mornings; and moreover, that they should be removed from the field immediately after one or two of the first showers of rain, after they are turned on pasture.

Wages range from 10 to 13 dollars per month, and board on the farm; and hands are scarce at that.

Mechanics ask and receive from 1 to 2 dollars per day. There have been great improvements in the way of buildings, roads, canals, &c., which have brought up labor rather higher than the farmers can afford to pay.

Lumber is in demand, and commands from $1 to $1 25 per hundred at the mills. Principal kinds used, poplar, oak, walnut, ash, sweet gum, cherry, and beech.

Orchards.—In the early settlement of the country, the farmers had hard struggling to get along, without devoting much time to their orchards—consequently, nearly all the old orchards are seedling fruit, and that of a poor quality. The second planting of orchards contains much better selections of fruit; yet they have been much improved by ingrafting in the top, within 8 or 10 years.

For about the same length of time, great pains have been taken by many individuals to cultivate young orchards, selected with care, and of the choicest fruits. There was a very limited crop of fruit last year; apples are now worth from 50 cents to $1 per bushel in the principal markets.

Stock.—Very little taste is manifested in the selection of stock for the farms of this country. Some few persons have turned their attention to the improvement of stock; but as a general thing carelessness prevails to a great extent.

We have no *Agricultural Society* in this county; and I think the prospect very poor for an organization of that kind soon. I think there is much good done by means of agricultural societies, where they are properly conducted. I shall feel much pleased to give my feeble aid in sustaining one in this county.

Reclaiming wet Lands.—Within a few years, the people are waking up to their interest on the subject of under and open drains; some of the most productive farms of this county, at the early settlement of the country, were deemed almost valueless, in consequence of low marshy places, which continued covered with water until late in the spring. Drains have been constructed through many of these places, which have prepared the land, and made it susceptible of a high state of cultivation, and added threefold to its previous value.

I have constructed on my farm about one mile of open and under drains, and in each case I find them to more than meet my most sanguine expectations. Time and space forbid my entering into detail upon the mode of construction, and beneficial results arising from them.

Yours respectfully,

JOHN P. BRADY.

Hon. Thos. Ewbank,
Com'r of Patents.

La Porte, Indiana, *November* 30*th*, 1849.

Sir:—Although our county is young as regards its settlement, the evidences of its resources are abundant, and are of such a character as to make it in time one of the wealthiest counties in the State. Its position is such as to give an impulse to the improvement of all its resources. As the enterprises recently set on foot, and all our farming operations are carried on as yet in an immethodical manner, the meagre account of our statistics will be readily excused. The following is briefly what I have to present.

Wheat.—The crop of the present year in this region has fallen considerably short of our average. Much of the wheat sown early was winter-killed, and late sown wheat was overtaken by the rust and greatly injured. The crop is estimated at nine bushels per acre; while the average of our crops in years past has been more than double that amount, or about 20 bushels. In 1839, the average of the wheat crop was 25 bushels. My own crop that year of 50 acres averaged 34 bushels per acre. This was sown on the sod turned over in May and June; time of sowing from 25th August to 10th September, and well harrowed down; cut and harvested between the 4th and the 20th July. The first when cut was in what is called the *dough*, the last very ripe. The first cut weighed 65 lbs. per bushel; the last 60 to 63 lbs. The first made the finest flour, and the greatest quantity to the bushel. In 1840, I had a beautiful field of 50 acres, surpassing that of the preceding year in appearance, until about the 20th June, at which time when in the milk it was completely blighted by the *rust*. Thousands of acres were thus destroyed this year. But we think we have a remedy for this evil. Indeed, we believe that all these disasters may be avoided by proper attention; first in preparing the ground properly, taking care not to grasp at too much; then sowing at the right season, which is from 25th August to 10th September, and next in choosing the best seed of that kind of wheat which ripens earliest. This is here found to be the *Mediterranean*, which ripens ten days or two weeks earlier than other varieties, which, when they escape the various enemies, are most productive.

Hay.—Timothy, clover, red-top and orchard grass, all thrive well either apart or together. The red-top is peculiarly suitable for our marshes; it very quickly destroys the rank marsh-grass, and solidates the ground, which very soon becomes firm pasture. Our marshes constitute a singular feature of our region of country. In many places they abound with bog-ore. They have been burned in the fall or spring, from time immemorial, by the Indians—and are the earliest pasture for cattle in spring.

Cattle.—Some of the best beef cattle taken to New York market are from this region—North Indiana. Some of the finest milk cows I have ever seen are in La Porte County. I single out one, owned by a neighbor of mine, of which to give a description. Although not of foreign blood, she is a most beautifully formed creature, and of such proportions in her make as indicate a fine milk cow. She is now about nine years old, and gives an amount of rich milk sufficient to produce twelve pounds of butter per week. This cow, when well taken care of, will give milk nine months in the year. Take the round number of 40 weeks, at 12 lbs. per week, at the average price of 12½ cents per lb., and the butter alone amounts to $60 made in nine months.

We export no cheese, although considerable is made for home consumption.

Potatoes.—As almost every community feels interested in the successful

culture of the Irish potato, which has become so extensive and useful an article of food, we deem any and every suggestion which can be made respecting its preservation from the rot to be acceptable. In this section, the Mercer potato seems to be most liable to the disease; so much so, that many persons have ceased to raise them, and cultivate such kinds as are of a harder texture, as the *pink-eye*, for instance, both yellow and white. The peculiarity of the Mercer is its productiveness and early ripening. It is also more easily cooked than any other variety—the pink-eye requiring one-third more time to cook than the Mercer. An experiment was recently made by a farmer, with the view to obtain the seed of the Mercer pure, and was completely successful. In 1847, he planted a single potato-ball or apple; only one seed grew, which produced a stalk upwards of six feet in length, and at the root a few small potatoes. These he planted in 1848, and obtained a little over a bushel of pure Mercers. From this bushel planted last spring, he has this fall harvested sixty bushels of fine potatoes, and *genuine Mercers.* It only remains to test by time these untainted potatoes.

Another farmer informs me that he has uniformly secured his potatoes from the rot by sprinkling over them, in planting, a small portion of unleached ashes before covering with earth.

Corn.—This is now considered the most important crop to which the farmer can turn his attention. It is certainly the most reliable crop in a pecuniary point of view. This season the crop is a large one, and in every respect the most productive we have ever had, and is now completely cured and chiefly housed. The average yield per acre is set down at 40 bushels. This county, which contains upwards of 300,000 acres, has about 15,000 acres in corn the present year, yielding a crop of 600,000 bushels. The average price for the corn marketed last summer was 38 cents. At that rate the value of the corn crop this year, after deducting 100,000 bushels for home consumption, will be $190,000.

In this county, *Iron ore* (bog-ore) abounds; indeed, the beds are said to be inexhaustible. In 1847, a furnace was erected to go by steam; and the business of 1848 was so extensive as to enable the proprietors to defray all the expenses of erection. This year, during the seven months from 1st April to 1st November, it turned out 700 tons castings, 300 tons of hollow-ware and stoves, and 400 tons of pigs; valued at $70,000.

The following is a list of the average prices of the articles mentioned, from May 1st to November 1st:—

Wheat per bushel 75 cents, corn 38 cents, oats 20 cents, buckwheat 33 cents, barley 45 cents. Irish potatoes 25 cents, sweet potatoes 75 cents, Ruta bagas 25 cents. Hay per ton $5 50. Butter per pound 12½ cents, Cheese 11 cents.

Respectfully yours,

JOHN C. REID.

Hon. Thomas Ewbank,
Com'r of Patents.

WHEAT.

"Your experience as to varieties—difference in weight, and of time in ripening—their enemies and diseases—soil and manures best adapted to. [*Circular.*

From the many communications received in reply to circulars, we make the following extracts on the subject of wheat:—

NEW ENGLAND.

Dr. M. F. Morrison, of Bath, N. H., says:—"In this section the *Black Sea* and *Tea* wheat have been most generally raised. The weevil has been its greatest enemy, but is less destructive now than in times past, and can be avoided by sowing as late as the 20th of May. A clayey loam is the best soil, with a compost of lime for manure. A new variety of winter wheat, that is, *new to us*, has been lately introduced, called the 'Golden Straw,' which has succeeded remarkably well. It has been generally supposed that winter wheat would not do well in this section, but this variety has exceeded our expectations. Mr. Leonard Richardson, in this county, (Grafton,) from three bushels of this variety, sown on four acres of newly cleared land, reaped 96 bushels and 6 quarts of excellent clean grain. Mr. Benjamin Thompson of the same town, from eleven acres new land, raised 200 bushels fine wheat. Several smaller pieces, both new and old cultivated land, have produced excellent crops. It is satisfactorily ascertained that the capacity of our land for raising winter grain is sufficient to induce further trials."

Mr. Isaac Hubbard, of Claremont, N. H., writes as follows:—"I came to the farm on which I now reside, more than seventy-two years ago. The country was then new, and wheat was usually the first crop. I cultivated for more than twenty years one variety—*white kernel and straw, bearded*—which seldom yielded less than 20, and often 25 and 30 bushels to the acre. At that time, from 1790 to 1810, more wheat was raised here than was wanted for home consumption, and the surplus was exported. Now we depend upon the West for flour. Very little wheat is sown by our farmers, and what little is sown usually goes to the weevil."

Mr. A. Robinson, of Portsmouth, N. H., says:—"Very few attempts have been made in this section to cultivate winter wheat, and these are usually at a loss to the farmer. Some seasons we obtain a decent crop, but usually the weevil, smut, mildew, and rust, are all very destructive to this grain."

Mr. Samuel Wells, of Northampton, Mass., says:—"Until within the last half century, wheat was raised and manufactured here in large quantities, and sent to distant markets. It was then our principal crop and standard of value. It is now subject to rust, blast, and winter-kill, and cannot be relied on as a profitable crop."

Mr. Aaron Bagg, of West Springfield, Mass., says: "I have raised the *red-chaff* and *white bald*. The former variety does best here, but wheat is an uncertain crop, and much less raised than formerly. The Hessian fly and weevil are its principal enemies. Manure is seldom applied to the wheat crop, but usually to the previous crop."

Mr. Loring Dean, of Manchester, Vt., says: "The kinds of wheat commonly raised are *Black Sea*, and *Tea* wheat; the former weighing about 62 lbs. and the latter 60 lbs. to the bushel; yields from 20 to 40 bushels per acre; ripens about the first of August; the weevil its greatest enemy, and rust its principal disease. The best soil is calcareous loam."

Mr. Ariel Thurston, of Hydepark, Vt., says: "The *Black Sea* variety is less liable to injury from rust or insects, but the bearded or bald white wheat makes the best flour. Soil best adapted, loam or marl; and on our highest lands the crop is much surer than on low grounds; average weight 60 lbs.; early sown wheat, cut about the middle of August—late sown, in September."

Mr. Geo. W. Drisko, of Jonesboro', Maine, writes: "But little attention is given to the cultivation of this grain in our section. The rust and mildew have been so destructive, that our farmers think growing wheat a sort of lottery, with the chances decidedly against them. Ten years ago we thought that a crop of from 15 to 25 bushels per acre might fairly be expected, but now we consider ourselves fortunate to get back the *seed*. The last field of wheat I saw growing was entirely destroyed by rust, rendering the labor expended on it a total loss."

Mr. Harvey Hantoon, of Unity, N. H., says: "The best variety we have is the *Black Sea* wheat. It produces 45 lbs. of flour to the bushel. The weevils are its greatest enemies, but they can be avoided by sowing as late as the 20th of May; harvested about 27th August. The Black Sea is less subject to the rust than any other variety we have tried; produce, about 20 bushels to the acre."

NEW YORK.

Mr. J. J. Thomas, of Macedon, Wayne Co., writes as follows: "The best variety for this region is the *Soules* wheat. The average yield this year has been 18 bushels per acre. The *Mediterranean* is peculiarly adapted to wet lands, and but little liable to the attacks of the Hessian fly; but the flour is usually regarded as of an inferior quality: this variety has yielded about 12 bushels per acre. The Soules wheat requires a dry soil; hence the Mediterranean will flourish where the Soules is not adapted to the soil. The *white flint* is but little cultivated; has yielded only about 12 bushels per acre."

Myron Adams, of East Bloomfield, Ontario Co., says: "Wheat is our principal crop. The kinds mostly cultivated are *white flint* and *Soules*. The *Soules wheat* is a variety lately introduced, and is every year becoming more and more popular. It requires earlier sowing and more seed than the *flint*, as it does not tiller or spread from the root like the last named variety; it is not as hardy, but on good land, under good cultivation, and with favorable seasons, it will produce more than any other kind cultivated in this region. The great objection to it is its liability to waste by shelling in harvesting. It should be cut before it is fully ripe. The *white flint* is a variety long known and cultivated in western New York. It is very hardy, with a small wiry straw, and short head, usually well filled. It produces well under almost any treatment; will bear much exposure to bad weather, and may be kept long in the field after harvest without shelling; yields well according to amount of straw. The berry is whiter, and makes whiter flour and more to the bushel, than any other kind with which I am acquainted.

Our wheat weighs from 58 to 63 lbs. to the bushel, and on the best wheat lands, in favorable seasons, the yield is from 30 to 40 bushels per acre. Much is grown, however, on poor lands under miserable culture, where from 6 to 15 bushels is called a fair crop. The amount of wheat per acre is increasing under improved culture and better implements constantly introduced among us, and also through the stimulus which Agricultural Societies afford."

"In Oswego county," Mr. S. Severance writes, "wheat culture is nearly abandoned, although when the county was new considerable was grown. Weevils and heavy snows in winter are very destructive to this crop. Seven-eighths of the flour consumed in this county is from western wheat." If our correspondent had said, that the peculiar earthy salts demanded by nature to form good crops of this grain had become measurably exhausted in the soil of that county, he would have hit the nail on the head. Seventy-five years ago Albany county produced an average of 25 bushels per acre—now the average is only 7½ bushels. Columbia county has fallen off from 20 to 6 bushels, and other counties in like ratio.

"To prevent rust and weevil," Mr. Joseph H. Merreck, of Delaware Co., says, "early sowing is indispensable. Lime, ashes, and gypsum are the fertilizers most relied upon for wheat in this section."

MIDDLE AND SOUTHERN STATES.

Joseph M. Nesbit, of Union Co., Pa., writes as follows: "Previous to 1820, the *red-chaff* was extensively cultivated, and esteemed one of our best varieties. About that time a new variety called the *blue-stem* was introduced, which on trial was found superior to the above, and we have now cultivated it almost exclusively for near twenty years. We have in the mean time tried several other kinds of both white and red wheat, to test their character; but have uniformly found them deficient in some important property, and have abandoned them as inferior to the *blue-stem*. In 1845 we harvested from 33½ acres an average of 36½ bushels per acre. Several acres could have been selected, the yield of which would have exceeded 40 bushels to the acre. We consider 25 bushels a fair average for the best wheat lands, and with proper cultivation we think they can be made to yield that. The best soils are river bottoms and limestone formations. *Quantity of seed.*—A few years ago, 1¼ bushels was considered amply sufficient, but now we are obliged to sow 1½ bushels at least, and some farmers sow 2 bushels. The latter quantity we consider too much. The necessity for thicker sowing is in part owing to the use of threshing machines, by which a portion of the seed is broken and the vitality destroyed; and also to the increase of predatory insects in long cultivated soils. Early sowing is the best preventive against the Hessian fly. We prefer to sow from 18th to 25th September; if later than the 25th, we run more risk from winter-killing, and if we escape this, are pretty sure to be caught by the rust or mildew in harvest."

Mr. William Price, of Chester county, Pa., says: "The *Mediterranean* wheat ripens earliest, about the 1st of July. It requires early sowing, and is seldom injured by the fly. Mildew or rust is produced by the bursting of the straw in the process of ripening, supposed to be caused by a superabundance of sap, which the plant cannot absorb or properly discharge. It therefore issues and evaporates, leaving a sediment or rust adhering to the straw, which prematurely dies, and the grain becomes shriveled or light.

A clayey soil is best adapted to wheat, and when lime is not an ingredient in the soil, it should be judiciously applied."

In Germantown, Pa., Mr. George Blight informs us, that the *Mediterranean* is preferred. It ripens in June, and thereby escapes the wet weather of July; yields about 20 bushels per acre. Soil, sandy loam with clay sub-soil. Barnyard manure is applied, about 20 loads to the acre, and ploughed in.

In Juniata county, Pa., the *white flint* is most cultivated, and ripens from July 1st to 10th. Soil, limestone; weight of grain, 60 to 64 lbs.; authority—Mr. Stewart Turbett, of Port Royal.

Mr. R. C. Holmes, Cape May, N. J., says: "The *Washington bald* is, perhaps, the most productive, the *Mediterranean* the most certain and heaviest—58 lbs. average weight per bushel. The fly, rust, and smut are very destructive. Barnyard manure, with lime, will produce the largest crops."

Mr. W. P. Morgan, of Princess Ann Co., Va., says: "There is but a small portion of our land adapted to the cultivation of wheat, and until the last 15 years very little was made; a few farmers sowed enough for a 'harvest home.' Since then there has been exported in a single year from this county, 20,000 bushels. But for three years past the crops of wheat have been on the decline, both in quantity and quality. The *early white* and *Mediterranean* are the varieties preferred."

Mr. H. B. Jones, of Brownsburg, Va., says: "Of all the varieties cultivated in this vicinity, the *Mediterranean* is most to be relied on; weighs from 60 to 64 lbs. per bushel. The *blue-stem* is a good red wheat, and weighs about 60 lbs. The New York *white flint* is highly esteemed by some; average yield about 10 bushels per acre."

Mr. J. Harris, of Cabanis Co., N. C., writes: "Wheat culture is becoming more general in this section, but the crop of 1849 will be far short of that of 1848, owing to the severe cold weather about the middle of April. A large portion of our *May* wheat, which is a variety much grown here, was then killed. We shall have this year about half the usual crop. Time of sowing, from 1st October to 15th November. Of the varieties grown, the *golden-chaff* and *May* wheat are usually preferred."

Dr. D. L. White, of Quincy, Fla., writes: "We have tried several kinds of wheat in Florida, and but one, a bearded variety, succeeds well in our climate. This kind has now been cultivated three years, and has never been affected by the rust or smut."

Simeon Oliver, of Hernando, Miss., says: "My experience is confined to *red May* wheat—it ripens the last of June, and weighs 60 to 65 lbs. to the bushel—yields 10, sometimes 15, to 1—is subject to rust, fly, and weevil—clay loam the best soil. No manures tried."

In Coosa county, Ala., Mr. S. S. Graham says: "*Horton* wheat is the most approved variety, and frequently weighs from 65 to 70 lbs to the bushel. Harvested the last of May. Wheat of all kinds killed by severe frost on the 16th May. Cotton seed, 50 bushels to the acre, used as a fertilizer for wheat. Cost of making wheat, about 75 cents per bushel—product per acre has increased of late years—when put up in good bags, it will be secure from the attacks of the weevil."

In Jackson county, Ala., Mr. James Williams writes: "Average yield in this county ranges from 10 to 15 bushels per acre—cost of raising, 50 cents per bushel. The *Orleans* variety preferred. Owing to severe frosts,

the crop this year will be 25 per cent. less than in 1848. The ordinary market value from 70 cents to $1.00 per bushel. We have not heretofore in Northern Alabama, grown more than half enough for home consumption; but as there appears a disposition among planters to quit cotton growing, they will necessarily raise more wheat. We have now the benefit of the Augusta and Charleston markets, which will offer greater inducements for the culture of this crop."

Mr. Benjamin Whitfield, of Tuscaloosa, Ala., writes: "The *Orleans* and *Haly* are the best varieties—ripen about 20th May. Smut may be prevented by steeping the seed in brine, and drying it in lime. The weevil can be kept from it by threshing early, and then putting it away in the chaff and short straw, and covering it well with straw. Our lands are destitute of lime, and consequently poor for wheat—8 bushels per acre is a full average crop. Cotton seed the best manure."

Mr. James Price, of Chattoogaville, Chattooga county, Ga., in a letter to Hon. J. H. Lumpkin, says: "We have abundant crops of every kind —100 acres of wheat yielded 20 to 25 bushels per acre, and I would send some to the Patent Office if it could be done free of expense. I learned my mode of preparing seed from the Report for 1844. To prevent injury from weevil, I cut my wheat, and let it stand two or three weeks in the field after cutting, in small shocks, well capped—thresh out dry, and run through the fan 10 or 15 days thereafter. I frequently strew some china leaves on it. These, together with the airing and cleaning, have been a preventive with me."

WESTERN STATES.

Mr. Wm. Lapham, of Mt. Tabor, Champaign county, Ohio, writes as follows: "Within the last three years the *Mediterranean* wheat has almost entirely superseded the kinds formerly cultivated; its weight is about 65 lbs. to the bushel. The *red-chaff bearded*, *Wabash*, and *Alabama* wheats have all been tried, but were found liable to both rust and winter-killing. The fly, the rust, and the sudden changes of temperature in winter are the chief causes of the failure of the wheat crop in this vicinity. The *Mediterranean*, from its ripening about 1st July, a week or ten days earlier than other varieties, escapes in a great measure injury from rust. It will also bear to be sown late in the fall, so as to escape the fly, unless the season is unusually warm. On very rich soil it is more liable to lodge than other varieties. The winters in this latitude are so subject to alternations of freezing and thawing, by which the wheat plant is thrown out of the ground, that the crop is very uncertain; averaging not more than 12 to 15 bushels per acre in a series of years. But in seasons when the temperature of the winter is comparatively uniform, and especially when the ground is most of the time covered with snow, the wheat crop attains its greatest yield; often averaging as high as 20 to 25 bushels per acre. I speak of crops where the usual ordinary care has been bestowed on preparation of the ground and sowing."

Mr. Alexander Ruff, of Xenia, Ohio, says: "My experience in varieties is, that *dark* or *red wheats* are hardier and a surer crop than the *white* or *fair* kinds. They ripen from 3 to 10 days earlier, and weigh 2 to 4 lbs. more per bushel. The Hessian fly is the greatest enemy to our wheat crop, and can best be prevented by rich soil and late sowing. The rust destroys much wheat, and has been constantly increasing for the last 12 years. The best soil is a clay, with a gravel subsoil, and lying high and dry. A crop

of corn or of oats should always be taken from the land after manuring, before the wheat is sown. This grain has been more uncertain, and less profitable to raise for some years past than it formerly was."

"The *red straw* and *Mediterranean*," says Mr. David Bush, of Delaware, Ohio, "are the earliest varieties, and least liable to rust, or injury from the fly, of any cultivated in this section. They are also one or two pounds heavier to the bushel—ripen about the last week in June—best soil, a sandy loam."

From Hamilton Co., Ohio, Mr. Israel Brown writes as follows: "The *red-chaff* bearded has hitherto been considered the most certain and profitable. Sowed about 10th Sept., and harvested 4th July—weight 60 to 62 lbs. per bushel. Sowing late prevents the ravages of the fly, but in this case the roots are not so firmly set, and it is consequently more liable to rust and winter-kill. The *golden straw* and *Mediterranean* have lately been introduced and are cultivated with success. The latter variety has become quite popular, as it will admit of late sowing and is less liable to the depredations of the fly. Average yield of this kind, 20 bushels per acre."

J. McComb, Jeromeville, Ashland Co., O., says: "The *Garden*, *blue-stem*, and *Mediterranean* are the varieties here grown; of these, the last is the heaviest. I consider sandy loam the soil best adapted to wheat. Cost of cultivation, $6 per acre; the average yield per acre is increasing in this county."

Mr. Linus Cone writes us from Troy, Mich., as follows: "The *Hutchinson* and *flint* are the varieties principally grown. The *Soules*, *blue-stem*, and several new varieties have lately been introduced, and promise well. Three years since, I sowed one peck *Soules* wheat on ⅛ of an acre: the product was 7 bushels, six of which were sown the next season on 4 acres and produced 152 bushels. The fly, rust, and winter-kill have materially injured the wheat crop for several years past. But if sown from 20th September to 5th October, there is no danger from the fly, and if the ground is properly cultivated and drained, we need have no fear of winter-kill. For several years the average product per acre has been decreasing, and the yield will not now exceed 10 bushels. Various causes have been assigned for this, and it is attributed by many to the seasons; but I am satisfied that the true cause of the failure is, the exhaustion of the food of the wheat plant in the soil, from constant cropping and shallow ploughing. Fourteen years since, I commenced an entirely new system of putting in wheat, by ploughing twice the usual depth, say 10 or 12 inches, and manuring with green crop (clover) where the soil was exhausted. I increased the seed to 2 bushels per acre, and by thorough draining and top-dressing with plaster in the spring, I doubled the yield per acre and rendered the crop sure. The highest average since then has been 43 bushels, and the lowest 23½ bushels to the acre, making a general average for the whole time, of over 30 bushels. Every bushel of this has been disposed of as merchantable, and would, with one trifling exception, come up to the legal standard of 60 lbs. per bushel. During this time, I have not been troubled with the insect, winter-kill, or rust. The soil in this county is clay loam, gravel, and sand, nearly all adapted to the cultivation of wheat."

NOTE.—We commend the example of Mr. Cone to wheat-growers everywhere. It will be seen from these extracts, that in almost every part of the country, through exhaustion of the soil and bad tillage, the wheat crops

are decreasing, and becoming more and more subject to disease. For this there is but one remedy: an improved system of culture. Farmers must supply to the soil those elements necessary for the formation of healthy wheat plants, which are constantly being taken from the land, and sent to distant markets. (See remarks on "*The Culture of Wheat.*")

From Wisconsin, Mr. C. S. Chase, of Racine, writes: "*Hedge row* for spring, and *red-chaff* and *Black Sea* for winter, are the principal varieties. We have, however, almost every kind in use. Wheat in this vicinity is mostly raised on the prairies, but the timber lands are better adapted to its culture. Its enemies are the weevil, mildew, and rust, the last having the present season destroyed one-half the crop. Wheat is the principal product of this state."

Mr. Origen Perkins, of Burlington, Wisconsin, says: "Wheat has been our staple product, and a few years ago we raised large crops at little cost of labor or skill. But for three or four years past it has been a precarious crop, especially on old lands, owing doubtless to the common fault of almost every farmer bringing more land under cultivation while it is fresh and clean, than they can afterwards manure and cultivate well. Thus they exhaust the food necessary for the production of wheat, and the plant grows every year weaker, and more liable to winter-kill. The last winter and spring were unusually favorable, and wheat promised a good crop, until it was blighted early in July by intensely hot weather, averaging about half a crop, say 10 bushels per acre. Owing to the causes above mentioned, together with the ravages of the fly and the high price of labor, wheat for some years past has been deemed an unprofitable crop."

Mr. Ralph Ware, President of an Agricultural Society called the "Buel Institute," in Putnam and the adjoining counties, Illinois, writes as follows: "The best varieties of wheat grown here are the *crate* or *velvet chaff* and the *red-chaff*. The latter is the heaviest, and stands the winter best. It weighs about 62 lbs. to the bushel. The *crate* wheat is somewhat the earliest, and suffers less from rust; time of harvesting from 1st to 8th July; average yield, 18 bushels per acre. The principal difficulties in its cultivation are from rust and dry freezing weather in winter. Spring wheat this year has been a failure. The average yield of wheat per acre is increasing in this section, from a better knowledge of the soil and climate, and from greater attention paid to its culture."

Mr. Wm. A. Hacker, of Jonesboro', Ill., remarks: "*May*, *blue-stem*, and *white flint* are the principal varieties; weight and time of ripening about the same, the *May* wheat being, if any thing, a little earlier than the others; average weight, 64 lbs. per bushel. The rust is very destructive, and this year we shall not have more than half a crop. Heavy alluvial the best soil. No manures necessary in this fertile country."

Dr. John Little, of Cass Co., Ind., says: "I have cultivated for three years past, a kind of wheat, the name of which I cannot with certainty give, but suppose it to be the 'Etrurian.' The seed was sent from the Department at Washington to a friend who cultivated it in his garden, until seed sufficient for a field crop was obtained. This variety promises to be highly beneficial to this region, as it will bear sowing late, ripens early, tillers well, and has firm straw. It also yields largely to the acre, and the proportion of flour to bran is greater than in the common varieties. The *crate*, *golden-chaff*, and *red-chaff* are much cultivated in this section. They

are about alike in weight and time of ripening; all, if sown early, are liable to injury from the fly, and if the sowing is delayed to escape this evil, there is much risk incurred from rust. But little attention has as yet been given to determine the difference made by soil and manuring of this crop; as in this region we have a comparatively virgin soil, and our cultivators are not prepared to make experimental observations."

Mr. B. W. Hawkins, of Portland, Jay Co., Ind., writes: "The average weight of the *Mediterranean* wheat in this section is 64 lbs., of *white chaff bearded* 62 lbs., *red-chaff* and *golden-stem* 60 lbs., *Wabash smooth* 60 lbs. The Mediterranean and golden stem ripen about a week earlier than the other varieties. Rust is the principal enemy. Sandy soil best adapted to this crop. Stable manure the only kind used in this part of the state."

Mr. John Bell writes from Floyd Co., Indiana, as follows: "The Mediterranean is now preferred to any other variety cultivated here. It is equal to any in weight, is less subject to injury from the fly, and as it ripens early rarely suffers from the rust. This year rust has been the cause of failure in almost every other variety, while this has generally yielded well. A calcareous or limestone soil best adapted to its culture."

In Scott Co., Iowa, Mr. James Grant writes as follows: "Spring wheat has been more successful than the winter varieties in this vicinity, in consequence of the injury the latter sustained from various irregularities in the weather, during the winter and spring. The *Red-river* variety of spring wheat is regarded as the best; it has a plump berry, thin skin, and good weight—often exceeding 64 lbs. to the bushel. It is more liable to smut than some other kinds, but this can be prevented by steeping the seed in lime and sowing when the ground is dry. I think it is the experience of every observing man that all kinds of wheat are more subject to smut when sown on *wet* lands, than on *dry*. This county contains about 5000 inhabitants, and 600 farmers; each of whom averages 60 acres under cultivation. They produced this year 200,000 bushels of wheat from about 20,000 acres."

Mr. J. W. Calvert, of St. Francis Co., Ark., writes as follows: "But two varieties have been tried in this section; the *red-chaff bearded*, and the *smooth May* wheat. The former makes bread the most palatable, and of the richest flavor. It is an uncertain crop, and very liable to injury from rust and mildew; but is less subject to attacks of the weevil than the latter variety. I raised both these kinds the same year, threshed and cleaned them out at the same time, and placed a flour barrel of each side by side. On examination some months after, I found the *May* wheat almost entirely destroyed by the weevil, while the *bearded* was very little injured. The result of this experiment would seem to favor the idea, that the egg of the insect is laid in the grain before maturity, and is hatched like the pea-bug, after the wheat is cleaned and put away; and that the bearded varieties are less liable to be thus stung by the insect than the bald or smooth kinds. It is said by some, that exposing the grain a few days to the sun after cleaning, or putting up in barrels that have contained salt, are sure preventives against the depredations of the weevil."

Mr. A. L. Burum of Mill Bend, East Tenn., gives the following as the results of his experience: "To insure a good crop on my part, I take a field of old grazing or clover land, without pasturing the year I intend to sow it. About the last of August I turn it over with a turn plough, after first coultering with a two-horse coulter as deep as practicable, covering all the vegetation. In October the wheat is sown, one bushel or forty quarts per

acre. If the soil is clay and wet, it will be necessary to cross-plough lightly before sowing—if a loam, my experience is against it. The ploughing should always be done in beds from 16 to 18 feet in width, and after sowing and harrowing, open the centres of the beds with the plough, to drain off the surplus moisture from the wheat. When this draining is well done, a wet stiff soil is best for wheat in East Tennessee. If the land is poor it should be manured with barn-yard manure before sowing, or with lime sown broadcast, 10 bushels to the acre, after sowing. When the above precautions are taken, the rust and smut rarely injure the crop. Should the blade of the wheat in April be heavy and of a deep green color, pasture it down; for this is an evidence that the root has not penetrated deep enough into the earth, and if let alone, it is liable to injury from late frosts, rust, &c. If the plant is of a yellowish hue, and inclined to blade out close to the ground, it is a good omen for an abundant crop."

From Kentucky, Mr. E. Starks, of Graves Co., writes as follows: "*May* wheat and *golden-chaff* are the kinds cultivated. I prefer the latter; it ripens about the 25th June—the *May* wheat ripens about the 10th. The *golden-chaff* has a long plump berry, and weighs from 62 to 65 lbs. to the bushel. Four bushels sown on four acres gave 82½ bushels at the harvest. I feed the wheat closely in winter to destroy the eggs of the Hessian fly—stock should be taken off as soon as the wheat begins to start in the spring. Early seeding is preferred. Ten bushels per acre is a fair average for this county."

Dr. S. D. Martin, of Clarke Co., Ky., writes: "Those kinds that ripen early are best for our locality. The Hessian fly and rust are both very injurious to the crop. If we could foresee what kind of seasons we are to have, so as to sow *too late* for the fly, and *too soon* for the rust, we should do well. The early varieties are more likely to escape the rust when sown late."

THE CULTURE OF WHEAT.

There is no crop, the skillful and successful cultivation of which on the same soil, from generation to generation, requires more art than is demanded to produce good wheat. To grow this grain on fresh land, adapted to the peculiar habits and wants of the plant is an easy task. But such fields, except in rare instances, fail sooner or later to produce sound and healthy plants, which are little liable to attacks from the malady called "rust," or which give lengthened ears or "heads," well filled with plump seeds.

Having long resided in the best wheat-growing district in the Union, the writer has devoted years of study and observation to all the influences of soil, climate, and constitutional peculiarities, which affect this bread-bearing plant. It is far more liable to smut, rust, and shrink in some soils than in others. This is true in western New York, and in every other section where wheat has long been cultivated. As the alkalies and other fertilizing elements become exhausted in the virgin soils of America, its crops of wheat not only become smaller on an average, but the plants fail in constitutional vigor, and are more liable to diseases and attacks from parasites and destructive insects. Defects in soil and improper nutrition lead to these disastrous results. Soils are defective in the following particulars:

1. They lack soluble silica, or flint in an available form, with which to produce a hard glassy stem that will be little subject to "rust." Soluble flint is never very abundant in cultivated soils; and after they have been tilled

some years, the supply is deficient in quantity. It is not very difficult to learn with considerable accuracy the amount of silica which rain-water as it falls on the earth will dissolve out of 1000 grains of soil in the course of 8 or 10 days. Hot water will dissolve more than cold; and water charged with carbonic acid more than pure water, which has been boiled. The experiments of Prof. Rogers of the University of Virginia, as published in Silliman's Journal, have a direct bearing on this subject. The researches of Prof. Emmons of Albany, in his elaborate and valuable work on "Agriculture," as a part of the Natural History of New York, show that 10,000 parts of soil yield only from 1 to 3 parts of soluble silica. The analyses of Dr. Jackson, as published in his Geological Survey of New Hampshire, give similar results. Earth taken from an old and badly exhausted field in Georgia gave the writer only one part of soluble flint in 100,000.

What elements of crops rain-water, at summer heat, will dissolve out of 10 or 20 lbs. of soil, in the course of three months, is a point in agricultural science which should be made the subject of numerous and rigid experiments. In this way, the capabilities of different soils and their adaptation to different crops may be tested, in connection with practical experiments in field culture, on the same kind of earth.

Few wheat-growers are aware how much dissolved flint an acre of good wheat demands to prevent its having coarse, soft, and spongy stems, which are any thing but a healthy organization of the plant. In the Journal of the Royal Agricultural Society of England, volume 7, there is an extended "Report on the Analysis of the Ashes of Plants, by *Thomas Way*, Professor of Chemistry at the Royal Agricultural College, Cirencester," which gives the results of 62 analyses of the ash of wheat, from as many samples of that grain, mostly grown on different soils and under different circumstances.

In this Report are given the quantity of wheat per acre, the weight of straw cut close to the ground on each acre, and also that of the chaff. These researches show, that from 93 to 150 lbs. of soluble flint are required to form an acre of wheat; and I will add from my own investigations, that three-fourths of this silica is demanded by nature during the last 60 days preceding the maturing of the crop. This is the period in which the stem acquires its solidity and strength, and most of its incombustible earthy matter. The quantity of this varies from 3 to 15 per cent. of the weight of the straw. Prof. Johnston and Sir Humphry Davy give instances in which more than 15 per cent. of ash was found; and Prof. Way gives cases where less than 3 per cent. was obtained. The mean of 40 samples was 4½ per cent. Dr. Sprengel gives 3½ as the mean of his analyses. M. Boussingault found an average of 7 per cent. As flint is truly the *bone* of all the grass family, imparting to them strength, as in cane, timothy, corn, oats, rye, rice, millet, and the proportion of this mineral varies as much in wheat-straw, as bone does in very lean and very fat hogs or cattle.

A young growing animal, whether a child or a colt, that is kept on food which lacks *bone-earth*, (phosphate of lime,) will have soft cartilaginous bones. Nature cannot substitute *iron* or any other mineral in the animal system, out of which to form hard strong bones; nor can any other mineral in the soil perform the peculiar function assigned to silica in the vital economy of cereal plants. To protect the living germs in the seeds of wheat, corn, oats, rye, barley, &c., the cuticle or bran of these seeds contains considerable flint. The same is true of chaff.

The question naturally arises,—How is the farmer to increase the quan-

tity of soluble silica or flint in his soil? This is a question of the highest practical importance. There are three principal ways in which the object named may be attained. First, by keeping fewer acres under the plough. Land in pasture, if well managed, will gain in fertility, and in the process accumulate soluble silica in the surface soil. In this way more wheat and surer crops may be made by cultivating a field in wheat two years than four in six. If the field in the mean time be devoted to wool-growing, butter or cheese-making, or to stock-raising, particular care must be taken to make great crops of grass or clover to grow on the land, and have all the manure both solid and liquid applied to its surface.

There are many counties in England that yield an average of 32 bushels of wheat per acre for ten crops in succession. There are but few of the old counties in the United States which average the half of that quantity: and yet our climate has greater agricultural capabilities than that of Great Britain. This fact has been made abundantly evident in an article under the head of "Agricultural Meteorology."

Another way to increase soluble silica in the soil, is to grow such crops, in rotation with wheat culture, as will best prevent the loss of dissolved flint at any time by leaching and washing, through the agency of rain-water. This remark is intended to apply more particularly to those large districts devoted to cotton and tobacco culture, plants that take up no considerable amount of silica, and which, by the constant stirring of the earth, and the clean tillage which they demand, favor the leaching of the soil. To keep too much of a plantation in these crops, is to lessen its capabilities for producing good crops of corn, wheat, and barley, at a small expense. Corn plants, well managed, will extract more pounds of silica in three or six months from the soil, than any other. As not an ounce of this mineral is needed in the animal economy of man or beast, it can all be composted in cornstalks, blades, and cobs, or in the dung and urine derived from corn, and be finally reorganized in the stems of wheat plants. Corn culture and wheat culture, if skilfully and scientifically conducted, go admirably together. Of the two, more bread, more meat, and more *money* can be made from the corn than from the wheat plant in this country. But so soon as what is called "high farming" in England, shall be popular in the United States, the crops both of wheat and corn grown here will demonstrate how little we appreciate the vast superiority of our climate for the economical feeding and clothing of the human family, over that of our "mother country." In several counties in England, it takes from 12 to 14 months to make a crop of wheat, after the seed is put in the ground. At or near the first of December, 1847, Mr. M. B. Moore, of Augusta, Ga., sowed a bushel of seed wheat on an acre and a half of ground, which gave him over 30 bushels by the middle of May following. This ground was then ploughed, and a fine crop of hay made and cut in July. After this, a good crop of peas was raised and harvested in October, before it was time to seed with wheat again, as was done. While the mean temperature of England is so low, that corn plants will not ripen, in Georgia one can grow a crop of wheat in the winter, and nearly two crops of corn in succession in the summer and autumn, before it is time to sow wheat again. No writer, to my knowledge, has done full justice to the vast agricultural resources of the southern portion of the American confederacy. But there is much of its soil which is not rich in the elements of bread. Nothing but the careful study of these elements, and of the natural laws by which they are govern-

ed, can remedy defects in wheat culture anywhere, but especially on very poor land.

All alkaline minerals, such as potash, soda, lime, ammonia, and magnesia, hasten the solution of the several insoluble compounds of silica in the soil. This fact should be remembered by every farmer. To undertake an explanation of the various ways in which alkalies, oxides, and acids act and react upon each other in the surface of the earth, when subject to tillage, would be out of place in this outline view of wheat-growing in the United States. I may state the fact, however, as ascertained by many analyses, that a cubic foot of good wheat soil in the valley of the Genesee, contains 20 times more lime than do the poorest soils in South Carolina and Georgia. The quantity of gypsum, bone-earth, and magnesia, available as food for plants, varies in an equal degree.

Not only lime, but phosphoric acid, potash, and magnesia are lacking in most soils, if one desires to raise a large crop of wheat, and have the seeds of the grain weigh as much as the straw. In a number of the specimens of wheat analyzed by Prof. Way, when cut close to the roots, the dry wheat outweighed the dry straw.

Having secured the growth of a bright, hard, glassy stem, the next thing is to develope a long, well-filled ear. To this end, available ammonia or nitrogen, phosphorus, potash, and magnesia are indispensable. Ammonia (spirits of hartshorn) is necessary to aid in forming the combustible part of the seed. The other ingredients named are required to assist in making the incombustible part of the grain. In 100 parts of the ash of wheat, there are the following substances, viz.:

Silica	2.28
Phosphoric acid	45.73
Sulphuric acid	0.32
Lime	2.06
Magnesia	10.94
Peroxide of iron	2.04
Potash	32.24
Soda	4.06
Chloride of sodium	0.27
Total	99.94

The quantity of ash in wheat varies from 1¼ to 2½ per cent.; the average is about 1.69. The amount of phosphoric acid in any given quantity of the ash of wheat varies from 40 to 50 per cent. of the same.

Seeds that have a thick cuticle or bran, and little gluten, contain a smaller per centage of phosphoric acid, and more silica. About one-third of the ash is potash; in nearly all cases magnesia varies from 9 to 14 per cent.; lime from 1½ to 6 per cent. Peroxide of iron is seldom as abundant as in the ash above given, and the same is true of soda. Chloride of sodium is common salt, and exists in a small quantity. Salt is beginning to be much used as a fertilizer on wheat lands in western New York. It operates indirectly to increase the crop.

The following may be taken as about the average composition of the ash of wheat-straw. It is "Specimen No. 40," in the tables of Prof. Way, and I copy verbatim all that is said on the subject: [Soil, sandy: subsoil, stone and clay; geological formation, silurian; drained; eight years in tillage; crop, after carrots, 20 tons per acre; tilled December, 1845: heavy

crop; mown, August 12th; carried, August 20th; estimated yield, 42 bushels per acre; straw long, grain good, weight 62 lbs. to the bushel.] Length of straw, 42 inches.

Relation of Grain, Straw, and Chaff.

	Actual quantities.	Per centage.
Grain	1633 lbs.	45.15
Straw	1732	47.89
Chaff	250	6.96
Total	3615 lbs.	

Specific gravity of grain	1.396
Weight of grain per acre	2604 lbs.
" " straw " "	$2775\frac{3}{10}$
" " chaff " "	$401\frac{1}{5}$

Mineral Matter in an Acre.

Wheat	$44\frac{1}{2}$ lbs.
Straw	113
Chaff	$47\frac{1}{5}$
Total	$204\frac{7}{10}$

Analysis of the Ash of the Grain.

	Per centage.	Removed from an acre.	
Silica	5.63	2 lbs.	8 oz.
Phosphoric acid	43.98	19	8
Sulphuric acid	.21	0	$1\frac{1}{5}$
Lime	1.50	0	$12\frac{8}{10}$
Magnesia	11.69	5	$3\frac{2}{10}$
Peroxide of iron	.29	0	2
Potash	34.51	15	$5\frac{6}{10}$
Soda	1.87	0	$13\frac{4}{10}$
	99.98	44 lbs.	$6\frac{1}{10}$ oz.

Analysis of Straw with its proportion of Chaff.

	Per centage.	Removed per acre.	
Silica	69.36	111 lbs.	$1\frac{7}{10}$ oz.
Phosphoric acid	5.24	8	$6\frac{7}{10}$
Sulphuric acid	4.45	7	$2\frac{2}{10}$
Lime	6.96	11	$2\frac{2}{25}$
Magnesia	1.45	2	5
Peroxide of iron	29	1	2
Potash	11.79	18	14
Soda	none	none.	
Chloride of sodium	"	"	
Total	99.54	160 lbs.	$1\frac{1}{10}$ oz.

If we subtract the 111 pounds of silica from the 160 pounds of minerals in the straw and chaff, the difference between what are left and those in wheat, is not great. As the stems and leaves of wheat plants grow before their seeds, if all the phosphoric acid, potash, and lime available in the soil

is consumed before the organization of the seeds begins, from what source is nature to draw her supply of these ingredients to form a good crop of wheat? If the farmer could reverse the order of nature, and grow a good supply of seeds first, and make straw afterwards, then many a one would harvest more wheat and less straw. But the cultivator must grow the stems, roots, and leaves of wheat, corn, and cotton, before nature will begin to form the seeds of these several plants: and every one should know that the atoms in the soil, which are consumed in organizing the bodies of cultivated plants, are, in the main, identical in kind with those required to make their seeds. The proportions, however, differ very considerably. Thus, while 100 parts of the ash of wheat contain an average of 45 parts of phosphoric acid, 100 of the ash of wheat-straw contain an average of only 5 parts. The difference is as 9 to 1. In magnesia the disparity is only a little less striking.

In what are called the organic elements of wheat (the combustible part) there are seven times more nitrogen in 100 pounds than in a like weight of straw. Hence, if the farmer converts straw into manure or compost, with the view ultimately of transforming it into wheat, it will take 7 pounds of straw to yield nitrogen enough to form one pound of wheat. Few are aware how much labor and money is annually lost by the feeding of plants on food not strictly adapted to the peculiar wants of nature in organizing the same. It is true, that most farmers depend on the natural fertility of the soil to nourish their crops, with perhaps the aid of a little stable and barn-yard manure, given to a part of them. As the natural resources of the land begin to fail, the supply must be drawn from other quarters than an exhausted field, or its cultivator will receive a poor return for the labor bestowed.

In Great Britain, where the necessity for liberal harvests and artificial fertilizing is far greater than in this country, the yield of wheat is said to be governed in a good degree by the amount of ammonia available as food for growing plants. This opinion is founded not at all on theory, but altogether on the teachings of experience. But in England, limeing and manuring are so much matters of constant practice, that few soils are so impoverished as many are in the United States. With land as naked and sterile as is much that can be found in the old thirteen colonies between Maine and Alabama, English farmers could hardly pay their tithes and poor rates, to say nothing of other taxes, rent, and the cost of producing their annual crops.

The first step towards making farming permanently profitable in all the older States, is to accumulate in a cheap and skillful manner the raw material for good harvests, in the soil.

Over a territory so extensive as the United States, it is extremely difficult to lay down any rule that will be applicable even to a moiety of the republic. There are, however, many beds of marl, greensand, gypsum, limestone, saline and vegetable deposites, available for the improvement of farming lands, in the Union. In addition to these, there are extraneous resources, the ocean with its fish, its shells, its sea-weeds, and its fertilizing salts which will yield an incalculable amount of bread and meat. In the subsoil and the atmosphere, every agriculturist has resources which are not duly appreciated by one in a thousand.

As a general thing, the soil must be *deepened* before it can be permanently improved. One acre of soil 12 inches deep is worth more to make money from, by cultivating it, than four acres 6 inches in depth. Thus, admit that a soil 6 inches deep will produce 14 bushels of wheat, and that 12

bushels will pay all expenses and give 2 for profit. Four acres of this land will yield a net income of only 8 bushels. Now double the depth of the soil and the crop: making the latter 28 bushels, instead of 14 per acre, and the former 12 inches deep, in the place of 6. Fifteen bushels, instead of twelve, will now pay all annual expenses, and leave a net profit not of *two* but of *thirteen* bushels per acre. If small crops will pay expenses, large ones will make a fortune; provided the farmer knows how to enrich his land in the most economical way. It is quite as easy to pay too dear for improving lands, as to lose money at any other business whatever.

The first thing for the operator to do is to acquire all the knowledge within his reach, from the experience of others who have done for their soils what he proposes to accomplish for his. Twenty or fifty dollars, invested in the best agricultural works in the English language, may save him thousands in the end, and double his profits in two years. The Agricultural Journals of the United States abound in information most useful to the practical farmer: and the back volumes, if collected and bound, will form a library of great value.

Rotation of Crops in connection with Wheat Culture.

A system of tillage and rotation which will pay best in one locality, or on one quality of soil, and in a particular climate, will be found not at all adapted to other localities, different soils and latitudes. Hence no rule can be laid down that will meet the peculiar exigencies of a farming country so extensive as the thirty States east of the Rocky Mountains. There are soils in Western New York, known to the writer, which have borne good crops of wheat every other year for more than twenty years, and produce better now than at the beginning of their cultivation. The resources of the earth in supplying the elements of wheat and corn are extremely variable. There are friable shaley rocks in Livingston county, N. Y., which crumble and slake when exposed to the air, that abound in all the earthy minerals necessary to form good wheat. These rocks are hundreds of feet in thickness, and have furnished much of the soil in the valley of the Genesee. The Onondaga Salt Group, and other contiguous strata, which extend into Canada West, form soils of extraordinary capacity for growing wheat. Indeed, the rocks and "drift" of a district give character to its arable surface.

Nothing is more needed at this time than a good geological map of the United States, accompanied by an accurate and popularly arranged work on agricultural geology. The writer had hoped to give such a map in this report; but it is thought best to devote another year to the collection of geological surveys and facts, and to the making of more critical and extended researches before publishing.

In the matter of rotation of crops in connection with wheat culture, clover and corn are generally preferred in all the Northern, and most of the Middle States. In New York, Ohio, Pennsylvania, Michigan, Wisconsin, Northern Indiana, and Illinois, so far as the writer is acquainted, a crop of wheat is made in rotation, either every third, fourth, or fifth year. Wherever wool growing is united with wheat culture, clover and wheat are the staple crops of the farm. Wool and superfine flour are exported; farmers taking nearly all the bran and shorts of the millers who purchase their wheat.

The offal of wheat makes not a little feed with chaff and cut straw. Many agriculturists grow peas, beans, turnips, beets, and carrots in large quantities, as well as clover, corn, oats, and barley. Peas and beans, both vines

and seeds, when well cured, are excellent feed for sheep; and on good land they are easily grown. They fit the soil well for wheat.

All the manure derived from sheep is husbanded with extreme care by farmers who are gradually enriching their lands. On a deep, rich, arable soil, quite a number of sheep may be kept per acre, if highly cultivated; and their manure prepares the land for producing generous crops of wheat at a small expense. Of all business men, farmers should be the closest calculators of *profit* and *loss*.

Great care should be taken to sow good and clean seed on clean land. Previous to putting the seed in the ground (drilling is preferable to sowing broad-cast) wheat should be soaked five or six hours—not longer—in strong brine. After this, add a peck or more of recently slaked lime to each bushel, and shovel it over well, that the lime may cover each seed. It is now ready to commit to the earth. Most good farmers roll the earth after seeding; some before.

In the Southern States, planters are in the habit of permitting their wheat to remain too long in the field after it is cradled, and in small shocks. Good barns are too scarce in all the planting States, and in some others.

Summer fallowing is generally abandoned, except in cases where old pastures and meadows, new prairie, or bushy bad fields are to be subdued. As a general rule, friable soils need not be ploughed long before the intended crop is expected to begin to grow. Among fertilizers, wood ashes, salt, bones, lime, guano, and poudrette have been used in wheat culture with decided advantage. In Great Britain, manure derived from the consumption of turnips and other root crops by sheep and neat cattle, is much used in preparing land for wheat. Sheep, clover and peas, corn and hogs, *rotate* well to insure the economical production of this staple. Manure is usually applied to the crop preceding wheat.

It may be interesting to some readers to see in this place the mean result of several organic analyses of wheat made by M. Boussingault. Wheat, dried at 230° degrees *in vacuo*, was found to contain:

Carbon	46.1
Oxygen	43.4
Hydrogen	5.8
Nitrogen	2.3
Ash	2.4
Total	100.0

Charcoal may be regarded as a fair representative of *carbon*, and water as the representative of both oxygen and hydrogen. It will be seen by the above figures, that over 95 per cent. of wheat is made up of elements which greatly abound in nature in an available condition; and the same is true of all other plants. It is doubtless owing to this circumstance, that a comparatively small quantity of guano and other highly concentrated fertilizers are able to produce crops five, ten, and fifty times greater than their own weight. Azote, or nitrogen, in the form of ammonia, or nitric acid, (aqua fortis,) and the incombustible part of plants are the elements which least abound in soils, and should be husbanded with the greatest care.

THE WHEAT CROP OF THE UNITED STATES. By Hon. C. P. HOLCOMB, of Delaware.

A SHORT wheat crop in England, Mr. Webster says, affects the exchanges of the civilized world. In the vast increase of population in the absence of long wars and famines, the importance of this staple is constantly increasing. Its cultivation is the most attractive and pleasant of all descriptions of husbandry; and its rewards are generally remunerating, when the soil and climate are favorable, and the markets are not too distant.

It is important to know what our relation is to this staple of the world, and what is, and what is likely to be, our contribution to the great aggregate of production. Beyond feeding our own great and rapidly increasing population, it probably will not soon if ever be very great. It is a mistake, I apprehend, to suppose our country is naturally a great wheat-producing country. The wheat district at present, in comparison to the whole extent of our territory, is limited. It is confined, so far as any appreciable amount is grown, to about ten degrees of latitude and twenty degrees of longitude, and embracing about one half the number of the states. The crop of 1848 is estimated by the Commissioner of Patents, at one hundred and twenty-six millions and our population at twenty-two millions. This gives a less number of bushels, per head, to our population than the consumption of Great Britain, which is generally set down at one hundred and sixty millions, or six bushels to each inhabitant. But with us Indian corn is a great substitute; so are potatoes and oats in Ireland and Scotland. Still our consumption of wheat, including the black population, is undoubtedly less, per head, than theirs. But in the absence of any certain data, to ascertain either the actual production, or our consumption, our only safe course is to take the actual excess, or the amount exported, after supplying our own wants. This, for the fiscal year 1848, being the crop of 1847, amounted, in flour and wheat, to twelve millions two hundred and ninety-four thousand one hundred seventy-five bushels, although Mr. Burke's figures would show a surplus of some forty millions! That there was not, and never has been any such surplus in the country is very evident, for the foreign demand was all the time good, and drew away all we had to part with.

The crop of 1848 was, undoubtedly, one of the best and largest we have ever grown; yet I have ascertained, by application at the Register's office, that the exports for the fiscal year 1849, amounted in wheat to but 1,527,534 bushels, and in flour to 2,108,013 barrels, or less by 226,676 bushels than the exports of 1848. Twelve millions is comparatively a small surplus in a favorable season, for a country with a population of twenty-two millions of inhabitants. The loss of a small per cent. in an unfavorable season would at once sink this excess.

There is in this connection, just now, another important matter to be considered. According to Professor Tucker of the University of Virginia, in his work on the *Progress of Population and Wealth in the United States*, the emigration to the country, from 1800 to 1840, amounted to about one million. The arrivals at New York alone, in the first eleven months of this year, were two hundred and thirty thousand four hundred and thirty-three, almost equal to *one-fourth* the number that came in the preceding *forty years.* I have endeavored to obtain the arrivals at other ports, and the aggregate within the last four years, but my correspondents

have not responded in time. But the number this year, will probably be found to be little, if any, less than four hundred thousand persons!

A single year brings to our shores, a number equalling the annual increase of the population of England, which Mr. Colman puts at four hundred thousand, or a number more than equal to the population of the largest city in the Union, and all are to be fed on wheaten bread, for as to Indian, "they'll none of it." An additional two or three million bushels of wheat finds a *certain* market in feeding the "grand army." But it may be said, that these masses, thus annually rolling upon our shores—a stream that seems to be exhaustless, pouring on and swelling with a constantly increasing volume and current—soon, on their arrival, become themselves producers. To some extent they do, but by far the largest portion of them go into our towns and manufacturing villages, and upon our public works.

According to some, our population, without reference to this *mass*-emigration, is likely to double within the next twenty-five years. Suppose the production to be one hundred and twenty-six millions, which is undoubtedly a high estimate, and our consumption and seed to be now one hundred millions, we shall have to increase the crop seventy-four millions by 1874, an amount falling but about ten millions short of the whole produce of the country as exhibited by the census of 1840.

Again, our last census exhibited the striking, and to many surprising, fact of the concentration of our population into towns and villages—the disproportionate increase of these over the rural districts. In some of the States, the *only* increase was in the towns, as in Rhode Island, Connecticut, Delaware, and Maryland. "In Massachusetts more than half the increase took place in the nine principal towns. Even in the great Agricultural State of New York, the whole increase was twenty-seven per cent.; in the fourteen largest towns, sixty-four and a half per cent.; in the State, exclusive of these towns, but nineteen per cent. In Pennsylvania, the gain in nine towns, thirty-nine and a quarter per cent.; in the State, but twenty-one and three-quarters per cent. In Ohio, the fifteen largest towns increased one hundred and thirty-eight per cent., the State but sixty-two per cent."—(*Macgregor's Progress of America,*) &c. The approaching census will undoubtedly show a still larger proportionate increase in the towns and villages.

It is notorious that *farm* laborers do not seem to increase; they are everywhere scarce, and the demand for their labor in the towns and manufacturing villages enable them to command high wages. Farmers can with difficulty obtain sufficient laboring-men, or servant-women for their kitchens, notwithstanding the almost half-million of arrivals! A portion certainly go to the West and clear up farms, but not a number, one-half or one-tenth, sufficient to supply at first, those who go to the cities, manufacturing villages, and upon the public works. The inference is, that any small surplus of wheat we may raise, or any probable augmentation of the crop, will be consumed by these additional *customers* of the farmer, and our otherwise rapidly increasing population.

Let us now notice more in detail, the different sections of our country as adapted to the growth of wheat.

The New England States, some of them aided in their recent enterprises by bounties offered by the State Governments, have failed to insure such success as is likely to encourage them to continue the culture of wheat; or at all events, to induce them to aim at increasing their product to any con-

siderable extent, since, as one of their own farmers candidly states, "the attempt to grow a crop of wheat is an experiment."

The States south of North Carolina, and inclusive of a part of this State, have never heretofore succeeded in growing wheat to any considerable extent, though there were periods in their history—before the general introduction of the culture of cotton—when, if it had been practicable to make this cereal one of their staples, they would certainly have done so. Besides the common dangers from rust, and blight, the fly, and sometimes the frost—as the past season—they have a most formidable enemy in the weevil. In Upper Georgia, in the Cherokee country in particular, wheat will probably be cultivated to some extent, and a limited cultivation of it by the planters for their own use will probably continue in several of the Southern States. But the cotton, rice, and sugar States, like the manufacturing States of New England, will not soon, if ever, add much to the supply of wheat; the rich staples of the former and the varied husbandry and grazing of the latter, suited to supply the immediate wants of a manufacturing population, will be likely to receive their attention in preference.

Kentucky and Tennessee, though their agricultural history dates back beyond the settlement of the north-western States, have already been outstripped by at least two of them. In neither of these States has the culture of wheat ever been put forward, and regarded as one of their best staples, or as very favorably adapted to their soil and climate. Still, notwithstanding the formidable danger from rust, the production of Tennessee is estimated to be equal to nine bushels to each person, and Kentucky about seven and a half bushels. Missouri may be classed with Kentucky and Tennessee, which she much resembles in soil, climate, and productions, except that she raises much less wheat than either, her crop being placed by the Commissioner of Patents at only two millions, or less than four bushels to each resident of the State. But, besides that the experience of the past discourages the idea that these fine States are likely to become great wheat-producing States, the fact that the staple of cotton may be cultivated over a considerable portion of one of them, and that hemp and tobacco are among the valuable products of the other two; that Tennessee is the very largest corn-producing State in the Union, showing her soil and climate are particularly adapted to this description of grain, and that Kentucky and Missouri are unsurpassed as grazing countries, and there is little ground to suppose that any change in their husbandry will very greatly or suddenly augment the production of wheat. Let us come now to the States of Indiana, Illinois, Wisconsin, and Iowa, and that *fabulous* wheat district or territory to the west of these again, from which, according to the vaticinations of some, may be drawn supplies of wheat to feed the population of both Europe and America, or fill warehouses that would sustain our people through a longer famine than that which afflicted the people of Egypt! I cannot help thinking, that, to some extent, this generally fertile district of country has, so far as the production of wheat is concerned, been "shouted forth in acclamations hyperbolical." My own impression in regard to it is, including the States last named, derived in part from observation, from intercourse and correspondence with intelligent agriculturists of these States, and from a careful examination of a geological survey of two of them, that the soil and climate of this whole district of country are *not* particularly favorable to the production of wheat. The popular idea I know to be otherwise. I am not going to dwell upon it, or to examine the subject

at any length. There is a single remark that may help to explain the reputation that has gone abroad in reference to the wheat-producing qualities of these lands. The prairie sod, when first broken up, generally produces wheat well, often most abundantly, provided it escapes the rust, insect, &c. But, when this ground has been much furrowed, becomes completely pulverized by exposure to the atmosphere, the light and friable mould, of which most of it is composed, drenched, as a good deal of it is, at times, with surface water, fails to hold or sustain the roots of the plant, it is thrown out, or winter-killed; and "winter-killed," "winter-killed," "winter-killed," we all know, is among the catalogue of disasters that almost annually reach us. Sometimes, when escaping the winter, the high winds of spring blow this light soil from the roots, exposing them to such an extent, that, in a dry time in particular, the wheat often perishes. When breaking up fresh prairies, there was much encouragement and promise of hope, but which, I believe, has not been, nor is likely to be, realized by their husbandmen, in the degree that early experiments induced them to look for.

As appears by the last report of the Commissioner of Patents, the crop of Illinois, in reference to population and production, is below that of Kentucky, and both Indiana and Illinois is below that of Tennessee. The crop of Indiana is set down at 8,500,000, her population at 1,000,000, or equal to 8½ bushels ahead. The production of Illinois is stated at 5,400,000, her population at 800,000, or less than seven bushels to each inhabitant—and both these "fair and fertile plains" are still farther behind the old "battered moors" of Maryland and Virginia.

Much of their wheat, too, is spring wheat, sown often on land where the fall crop had winter-killed, increasing the number of bushels much more than the value of the crop. I have heard it estimated that full one-third of all the wheat shipped from Chicago was of this description. Chicago is their great wheat depot. Several millions of bushels are shipped from this point, *the contributions from parts of three States*, Wisconsin, Indiana, and Illinois, and which concentration of their joint product at this new western city, or something else, seems to have imparted to each and all these States the reputation of great wheat-growing States, though they are in fact, with the advantage of a virgin soil, behind several of the Western States, and two at least of the Eastern or Atlantic States. The geological explorations of the Hon. Robert Dale Owen, undertaken under the authority of Congress, throws much light on the character of the soil of Wisconsin and Iowa, and the description given undoubtedly characterizes much of that region of country. The specific gravity of the soil, Mr. Owen states to be remarkably *light;* but what he represents to be a "striking feature in the character of the Iowa and Wisconsin soils, is the *entire absence*, *in the most of the specimens*, *of clay*, *and the large proportion of silex*." Again he speaks of their being particularly adapted to the growth of the sugar-beet, which he truly says, "flourishes best in a *loose fertile mould*." Again, he detected no phosphates; but they might be there, as the *virgin* soil produced good wheat. So does the virgin soil of most of the prairie land.—"The soil was rich in geine," &c. But I submit that this does not describe a wheat soil, hardly in any one particular. Liebig tells us, that "however great the proportion of *humus* in a soil, it does not necessarily follow it will produce wheat"—and cites the country of Brazil.

Again, he adds, "how does it happen that wheat does not flourish on a sandy soil, (which much of the soil of these States is described to be,) and

that a calcareous soil is also unsuitable to its growth, unless it be mixed with a considerable quantity of clay?"

The late Mr. Colman, in his *European Agriculture*, states, that "the soil preferred for wheat (in England) is a strong soil with a large proportion of clay." But the question after all is, not whether these States cannot grow wheat, and in comparatively large quantities, for we know that while their lands are fresh, they can and do—but whether, considering the hazard of the crop from winter-killing, the rust, the fly—the risk from the two former being equal to a large per cent. premium of insurance, they are not likely to find their interest in grazing, in raising and feeding stock, instead of attempting to extend their wheat husbandry. Lord Brougham has said, that grazing countries are always the most prosperous, and their population the most contented and happy. The meat markets of Great Britain are likely to prove better, and more stable for us, than their grain markets.

The Hon. Henry L. Ellsworth, a distinguished citizen, and large farmer of Indiana—distinguished throughout the Union for his zeal in the cause of agriculture—thus expresses himself on this subject: "After a full consideration of the subject, I am satisfied that stock raising at the West is much more profitable than raising grain. Indeed, an examination of the north-western States shows a vast difference in the wealth of the grazier over those who crop with grain. The profits of wheat appear well in expectation, on paper, but the prospect is blasted by a severe winter, appearance of insects, bad weather in harvesting, in threshing, for there are but few barns at the West, or transporting to market, or last, a fluctuation in the market itself."

Such is the opinion of Mr. Ellsworth, the result of observation and experience, himself largely interested in ascertaining the safest and surest course to be pursued. The destiny he has indicated for this beautiful, fertile region of country, will undoubtedly be fulfilled; it will become a great pastoral, stock-raising, and stock-feeding country.

Ohio stands now, as she did at the census of 1840, at the head of all the wheat States, in the aggregate of production; her crop of 1848 being estimated at 20,000,000, which is about equal to 10½ bushels per head of her population. The geological survey of this State, and the character of the soil, as described in the Reports of the Board of Agriculture, in a large range of her counties, as a "clayey soil," "clayey loam," "clay subsoil," &c., shows Ohio to possess a fine natural wheat soil, if indeed, after thirty years of a generally successful wheat husbandry, such additional testimony or confirmation was necessary. I am not in possession of all the reports of her Board of Agriculture, but if I mistake not, it was stated in one of them, that Ohio had already reached her maximum of production, until an improved husbandry should be introduced, to advance it still further.

Michigan has also been successful in the cultivation of wheat. Her burr-oak openings are unsurpassed in producing wheat. They are intervening ridges between low grounds, or marshes and bodies of water, and their location not generally considered very healthy. A doubt has also been suggested as to whether this soil, being a clayey loam, resting on a sandy and gravelly subsoil, is likely to wear as well as some other portions of the fertile soil of the State. The Commissioner of Patents puts her crop for 1848 at 10,000,000 of bushels, which is equal to 23½ bushels to each inhabitant! By the census of 1840, the population of Michigan was 212,267; number of bushels of wheat, 2,157,108. Her population in 1848 is estimated at

412,000. While she has barely doubled her population, she has, according to the above estimate, more than *quadrupled* her production of wheat—increased it at the rate of about one million of bushels a year for eight consecutive years, making the quantity she grows to each head of her population, *more than double* that of any State in the Union. This *may* all be so, but we shall soon have the *record*, the census of 1850; that will be more reliable than the estimates of our sanguine friends; we must call for the record; it will be more satisfactory than the *ciphering*. Michigan has probably more to fear from the winter than Ohio; and in reference to all of the States west of the Alleghany, the contingencies attending the crop from winter-killing, and rust in particular, are much greater than on the Atlantic slope. The cause with them, too, is atmospheric, and the elements may not be controlled; and no decided amelioration may, perhaps, be expected, varying, however, as the seasons are more or less favorable from year to year. While we are not altogether safe from peril from the same causes, the danger is much less. The fly, of late, in our Atlantic wheat States, is regarded as our worst enemy. But the fly has its enemies, which may overtake and destroy it; or a change of seed is sometimes a preventive; while high cultivation insures, to a certain extent, against its more serious ravages.

We can at least say, and appeal to the past history of the country to show it, that for a period of more than one hundred years, the supply of the Atlantic wheat States has generally been constant, and for the most part abundant. They have furnished the "staff of life" to several generations of men, and, cotemporary with it, an annual amount for export, that materially assisted in regulating the exchanges of the country.

Yet are these *nursing mothers* of the old thirteen thus *flatteringly* noticed by one of the "commercial writers," and which is copied into Macgregor's work on this country!

"In all the old wheat districts of Delaware, Maryland, and Virginia, the land is all so completely exhausted by continued cropping, that it must be abandoned for years, until restored to vigor by the recuperative powers of nature, or transferred to another population better qualified to recover it by art and industry."

Not a single *biscuit*, it will be seen, is to be expected from us! The eyes of this commercial writer were evidently "Westward, ho!" The "Great West" would have to grow the wheat; for she could grow corn, and fat hogs, and could surely furnish the *bread* as well as the *meat*—provide the whole bill of fare!

But however this writer may have reasoned, possibly he had in view, and was dazzled, as some others seem to have been, by the Chicago wheat granaries. But however he may have reasoned, had he taken the trouble to have informed himself, he would have ascertained that *two* out of the three of these thus "disfranchised" States were, at the time this statement was made, (1842,) excelled but by *two* other States in the Union in the production of wheat, in the ratio of production to population. The crop of Virginia is set down, in 1838, at 12,250,000; her population, 1,295,000, which is equal to nearly ten bushels to each inhabitant; while the crop of Maryland is estimated at 5,150,000—her population, 510,000; the ratio being a little over ten bushels a head. In Delaware it is about seven bushels; and I repeat, that even taking the joint production of the three States, and their aggregate population, and Michigan and Ohio alone excel them as wheat-growing

States. So much for the opinions and views of men who sit in their counting-houses and write about "The Crops."

In an interesting "Report on the Breadstuffs of the United States," dated at Rutgers College, by Lewis C. Beck, M. D., that appears in the last Patent Office Report, the wheat district of the country is also mapped, or indicated as lying to the West. But Dr. Beck includes *western* New York and *western* Pennsylvania, and very properly; but why not *eastern* New York, and *eastern* Pennsylvania? for the crop of New York is 15,500,000, or 5½ bushels to each person: the crop of Pennsylvania, 15,000,000, or six bushels to each inhabitant; while a large portion of their population are engaged in commerce, manufactures, and the mines.

That our land, particularly in the lower wheat States, has been hard cropped, there is no doubt. That much of it requires renovation, there is as little doubt; and just as little, that the farmers of Delaware, Maryland, and Virginia are engaged in *earnest* in effecting this change. They have at their command the powerful fertilizing agents, *lime* and *marl*. They are applying one or both of these in *immense quantities* to whole districts of country. New Jersey and North Carolina, though neither of them large wheat-producing states—but in North Carolina the quantity is very much increasing—are participating in these efforts at improvement. The concentrated manures, particularly guano, find now a ready and large market throughout our whole section of country; and I do not agree, every thing considered, soil, climate, markets, price of land, that the West, or *any portion of the West*, has any great advantage over us—in fact, any advantage at all. And such *exclusive* claims as are set up for her, so far as wheat husbandry is concerned, I believe to be unfounded, and that our wheat fields will be the last place we shall be driven from. Still, nobody under-estimates the teeming prolific West. Let her hang out her cornucopia; it is her just emblem. But let it be understood that we, of the *old thirteen*, expect still to *raise our grist for the mill*, and, possibly, with the smiles of a kind Providence upon us, may have a few *bakings to spare*. We neither expect our "completely exhausted lands will be abandoned for years," nor do we consent to be *ostracised* from them by commercial writers, that they may be "transferred to another population better qualified by art and industry to improve them."

But it is never in good taste to talk too much of ourselves, and boast too much of what we are, and what we can do. I prefer letting a western agriculturist speak for us. No man is, perhaps, better informed on the agricultural resources of this country than Solon Robinson; no one knows the country better, or, I believe, so well; for in his zeal in the cause, there is little of it he has not explored and *personally* examined; while no man is more independent, candid, and fearless in expressing his opinions, affect whom they may. Mr. Robinson, in speaking of the wheat crop and wheat district, recently said:

"In southern Indiana, Illinois, all of Kentucky, Tennessee, and northern Missouri, it is affected by the rust. It is the most precarious crop in the West, and altogether unsafe for the farmer to rely on. Grazing is likely to engage the farmer of the West. I consider *Delaware*, *Maryland*, and *Virginia* the best wheat States in the Union. I saw one thousand acres of wheat in Virginia, last season, better than any one thousand I ever saw in the West. *Lime*, *plaster*, and *clover* will bring wheat on any of the exhausted

lands of these States, and make it a more reliable crop than in any of the Western States."

This opinion of Mr. Robinson should encourage our farmers to renewed efforts. It is more with this view, I hardly need say, than to defend against any attack from any quarter, or to try any issue between the old wheat States and the new, that the opinions of these western gentlemen, Mr. Ellsworth, and Mr. Robinson, are cited. All the wheat fields and all the grazing pastures are alike within the borders of our happy country, and her husbandmen and graziers are brethren of one family. Let us, then, in this spirit of a generous emulation, press forward. A portion of the West may, in this spirited race, have a little the *heels* of us; but the *old nags* will be sure to come up to the *score;* they will pay no *forfeit;* and it will be time enough when the race is run, to say who wins; who's beaten, and who has been distanced.

But the encouragement to all is great, for the demand must go on rapidly increasing; and it is only by an improved husbandry that it will be adequately supplied. The foreign market, on the terms it can now be reached, is of great value to us, as generally receiving any surplus we may have to spare at remunerating prices: but it is not always this will be on hand; and I venture to predict that the *present* will be found to be one of those years, as I agree with one of our most intelligent and best informed Brandywine millers, Mr. Lee, "that the price of wheat and flour will have to advance to the point of preventing any considerable exports, or before next harvest it will be found we are short, and the price will go up very much."

C. P. HOLCOMB.

New Castle, Del., Dec. 15, 1849.

(*American Farmer.*)

CORN.

"What varieties most esteemed, and for what reasons—what the difference in time of ripening—is it liable to change of character and qualities according to soil and climate, and other influences, and your observations on that point—give the estimated value of the shuck as compared with the blade, and of both as compared with good hay, weight for weight—what is the value of green corn for soiling cattle, and especially for producing milk—your experience as to feeding grain, whole or ground, cooked or raw." [*Circular.*

The following extracts from replies received in answer to the above circular, will be read with interest: as they contain much valuable information on the subject of Corn Culture, derived from the experience of agriculturists in all parts of the country:

EASTERN STATES.

Mr. Temple Cutler, of Hamilton, Mass., writes as follows: "So long as we select the earliest and ripest ears of corn for seed, and plant only one kind in a field, it does not change its character."

Mr. C. has been making experiments on the relative value of the upper half of corn stalks, including the leaves, as compared with good hay. "When early cut and properly cured," he says, "the forage thus obtained is equal to timothy or other hay. My method is to cut and get them in the same day, in fair weather: giving them only a little time to wilt in the sun. In the barn, I place them on poles, in good ventilation, where they will keep perfectly sweet, and of a green color. Cattle will eat blades and stalks thus cured, with great avidity, leaving not a stalk behind. Cows will give more milk when fed on these than on the best clover hay, and I am confident they contain more fattening properties. By experience I have been taught to set a high value on green corn (stems and leaves of young corn) for producing milk in cows: and it is also highly valuable as the best and most convenient article for soiling cattle. It may be planted in drills, or sown broad-cast, at different times, so as always to have a crop in the proper stage for use. I have made careful and accurate experiments in the above subjects, and have ascertained, by weighing the top stalks, that an acre producing 45 bushels of corn will yield 2000 lbs. of dry stalks, cut above the ears. The lower part of the stalks will weigh still more, if cut and cured in a similar way. Our farmers generally reckon the manure and cultivation devoted to an acre of corn as worth \$20. The average yield per acre, in this vicinity, is on the increase: being now from 40 to 60 bushels. This result is attained by deeper ploughing, and spreading more manure on fewer acres of land." The suggestions of Mr. Cutler, in reference to the curing of fodder, are important to farmers who cultivate small crops of corn. Green corn, cut for soiling, should be partly cured by drying, before fed to cows or other animals. The proper stage for cutting is when the seeds begin to form, for then the organized elements of the kernels, or seeds, are diffused throughout the whole plant. These young plants contain 88 per cent. of water, which is too much for health—they should therefore be partially cured. Potatoes and green clover contain about 75 per cent. of

water, which is enough for any green food to have, when fed to animals. All forage plants should be cured in the shade, so far as practicable.

Mr. J. M. Merreck, of Wilbraham, Mass., gives the following statement: "The varieties mostly cultivated in this section are the common *eight-rowed yellow*, and the *Dutton* corn—the first is preferred—time of ripening from 1st to 20th September, the *Dutton* being from six to ten days earlier. It is very liable to mix, from other varieties planted near, by the farina from the tassel lodging on the silk of the kind affected. Value of shuck compared with the blade, about 1 to 2. Value for soiling has not been tested in this section. Average yield, per acre, about 25 bushels."

Mr. Aaron Bagg, of West Springfield, Mass., says: "*Eight-rowed yellow* generally preferred, as it ripens earlier, shells easier, has a smaller cob, and less growth of stalk than any other variety. Soil and climate very much modify the character of any particular variety. Value of shucks and blades for fodder, about equal to one-third that of good hay—for feeding to stock the *meal* is much better than the *whole grain*, and *cooked*, better than *raw*. Standard weight per bushel, 56 lbs."

Mr. Allen W. Dodge, of Hamilton, Essex Co., Mass., writes as follows: "The *eight-rowed* variety is preferred, as it ripens soonest, and has less cob than other kinds. The tops and blades, when well cured, are considered of equal value, ton for ton, with English hay. Green corn fodder is extensively raised for soiling milch cows in the latter part of summer, which is often very dry; we could not well dispense with it at that season. It probably yields more, per acre, than any other description of fodder that can be raised, and for producing milk and butter is most excellent. Cows fed on it in August will give nearly as much milk as in the height of feed in June."

Mr. E. T. Morrill, of Atkinson, Maine, sends the following "Estimate of the cost of producing a crop of Indian corn on 20 acres of land:

Ploughing, (in stubble) per acre	$1 00
Harrowing and furrowing, per acre	50
Carting 10 loads manure, per acre	1 50
Seed, 25 c.—Planting, $1 00 per acre	1 25
Hoeing and cultivating twice	3 33
Cutting, husking, and shelling	4 00
Cost of crop, per acre	$11 58
" " on 20 acres	$231 60

Yield on 20 acres, 600 bus. shelled corn, worth $1 per bus	$600 00
40 loads pumpkins for hogs or cattle	100 00
Fodder valued at $5 per acre	100 00
	$800 00
Cost of crop	231 60
Profit	$568 40

The variety most esteemed is the large *yellow eight-rowed;* it will ripen in about three months, or three and a half, if the ground is not too rich. I consider corn fodder excellent for soiling, and especially for producing milk."

Mr. S. Hale, of Keene, N. H., writes as follows: "The variety principally cultivated in this vicinity is the *yellow flint*. The greatest obstacle to the culture of this grain here, is late frost in spring, and early frost in fall. Our farmers, therefore, often get seed from the north. Seed brought from Canada, where the season is shorter, and planted here two or three years, produces every year larger kernels, ears, and stalks, and becomes a very valuable variety. A neighbor of mine planted during the last season, on half an acre, a kind remarkable for the number of ears on a stalk. He spread and put in the hills sixteen loads of manure, and the yield was fifty-one bushels. The cobs were small, and the largest number of ears on a stalk was six."

Mr. D. D. Marsh, of Croydon, Sullivan, Co., N. H., says: "Notwithstanding the partial injury from the drought, and the great fears at one time entertained respecting it, the crop of corn in this section has proved an average one. The *eight-rowed Canada* and *Dutton* are the kinds best adapted to this northern climate, as they are two or three weeks earlier than any other corn when acclimated, and become a much surer crop with the same care in cultivation. It is now raised at less expense and in larger quantities than a few years since. Two tons of the shuck or blade are thought equal in value to one ton of good hay. My experience as to feeding the grain whole or ground, cooked or raw, warrants me in giving an opinion decidedly in favor of grinding and cooking, for most kinds of stock."

Mr. Isaac Hubbard, of Claremont, N. H., says: "An experience of more than sixty years has convinced me that corn does best when planted in the same neighborhood for several years until it has become acclimated. We consider it here a very sure crop. The only failure I recollect was in 1816. That year no corn was raised, but small grains were abundant. I prefer the *yellow eight-rowed*, as it ripens earlier, yields better, and exhausts the soil less, than any other kind; average produce 40 bushels per acre."

Mr. Loring Dean, of Manchester, Vt., says: "Corn stalks, when well cured, are worth half their weight of hay. Corn sown broad-cast, and cut green, is very valuable for its nutritive qualities, and for producing milk and butter. I think it adds one-third to the value of the grain to have it cooked and ground before feeding. The usual weight is about 58 lbs., and the yield varies from 20 to 100 bushels per acre; *yellow eight-rowed* the best variety."

Mr. Ariel Thurston, of Hydepark, Vt., writes, that "corn meal *cooked* is of double the value for feeding to stock of the whole grain uncooked. The blades are never stripped from the stalk and fed separate: but the stalks, blades and all, are esteemed at about half the value of hay. The *eight-rowed* is preferred. Some other varieties grow larger and yield better, but are more liable to be injured from early frosts in fall."

Mr. John G. Clarke, of South Kingston, R. I., says, that in that section, the Agricultural Societies and papers have, by diffusing information among farmers, caused more attention to be paid to the culture of corn and other grains, and increased the average product per acre. "There is a new variety," he says, "grown in this vicinity, called the *Philipene*. It was first raised by a colored man near here, who has given it the name. The ears are small, but the grain is firm and hard, and weighs more than most kinds to the bushel. It is a mixture of all colors, but mostly white and yellow. It ripens three or four weeks earlier than most other kinds, and is highly esteemed on this account. The ears increase in size from a few years' cultivation on very rich land; but it will yield more on very poor land than any of the larger kinds."

Mr. Isaac Backus, of Windham Co., Conn., says: "Corn ground, and cooked, will yield much more nutriment than when fed to hogs raw and unground; average value here, $1\frac{1}{2}$ cents per pound. Any land that will produce 25 bushels of corn per acre, by ordinary cultivation, will grow 50 bushels if 500 pounds of guano be applied. It should be put in the hill, but not in contact with the seed."

NEW YORK AND WESTERN STATES.

Mr. Seth Severance, of Oswego Co., N. Y., writes as follows: "Corn is cultivated here to considerable extent. The *Dutton* is in favor with many, as it yields well, produces a large amount of fodder, and is easy to husk from the ears being large. It is, however, a week later than the *eight-rowed yellow*, which is in most common use. The *red blazed* is highly esteemed from its having less stalk and leaves in proportion to the yield of grain, than any other kind: this is very desirable on our damp soils, as it leaves the ground open to the sun's rays. Seed brought from abroad gradually changes its character, and adapts itself to our soil and climate. Thus Canada corn, the ears of which there grow only about 5 inches long, will, after being cultivated here a few years, produce ears of double that length. Corn is to some extent sown broad-cast for soiling cattle, both for fattening and for dairy purposes. It has been raised in this way by a neighbor of mine who keeps 30 cows; he thinks it invaluable for producing milk. Average yield, about 28 bushels, although fields often produce from 60 to 70 bushels per acre. The average is increasing from better cultivation and a manly rivalry among farmers."

Mr. L. Smith, President of the "Sullivan Co. (N. Y.) Agricultural Society," says, "I consider corn-stalks for feed preferable to hay, especially for producing milk. I have practised cutting the stalks fine and scalding them in boiling water, with good success. Steaming would, perhaps, be preferable to scalding, but in this I have had no experience. When prepared in this way, it is the best fodder that milch cows can have, in point of economy and profit. The following crops of corn were offered for premiums at the fair of our society, recently held—one of 115 bushels of shelled corn, one of 100 bushels, one of 90, and one of 80 bushels."

Mr. J. J. Thomas, of Macedon, Wayne Co., N. Y., gives the following as the result of his experience: "Corn-fodder obtained, as it generally is here, by cutting the stalks close to the ground, is about half as valuable as good hay, as cattle will eat only a part of it. But if sown thick for fodder only, the stalks grow small, and are wholly eaten by cattle. A ton of this is more valuable for cows than a ton of hay—being richer, and greatly preferred by them. Late in the summer and early in autumn, it is especially valuable, and adds to the richness and quantity of the milk. It appears to add to, rather than diminish the fertility of the land, as no grain forms or ripens. Of three successive crops, each was larger (without manure) than the preceding one; and the cost of producing did not amount, with me, to over $1.50 per ton—the crop usually yielding 4 to 6 tons per acre of dried fodder. The culture is as follows: Plough the ground, harrow it, and furrow it in one direction, with a one-horse plough; let a man take a ½ bushel hand-basket of seed, and walking rapidly along, strew the corn in each furrow at the rate of 3 bushels per acre. A harrow or cultivator passed lengthwise with the furrow will cover it. Several acres may thus be sown in a day. When the corn is about a foot high, a one-horse cultivator run between the drills is sufficient; the growth of fodder smothering all weeds, obviating the necessity of hoeing, and leaving the field in autumn as clean as a floor; hence this crop is an excellent weed-killer. It may be sown in the summer after the usual time of planting corn, and harvested (by mowing or with the sickle) early in autumn. It is best bound in bundles and placed in

large shocks to dry—great pains should be taken to have it thoroughly dried before stacking; and it is often best to leave it standing in the shock until winter. Corn for fodder sown *broadcast* is worthless as a crop, compared with this mode; needing more seed, and leaving the ground foul. By careful experiment it was found, that sown at the rate of 20 stalks to the foot in the drill, only ⅔ the amount was produced, compared with 40 stalks to the foot. Hence plenty of seed should be used. These observations are founded wholly on several years' personal experience, and it is believed that this crop will yet form a very important one, from lessening, in a great degree, the amount of meadow lands needed, and forming an enriching fallow crop."

Mr. Nathan Dustin, of Delaware Co., Ohio, says: "Corn is the great staple in Ohio. In this middle section of the State, a grade between the *gourd-seed* and *yellow-dent* ripens best—and yields oftentimes 50 bushels per acre—it is best ground for cattle and cooked for hogs."

Mr. John Kuhn, of Ashland Co., Ohio, says: "Shuck and blades, weight for weight, are worth as much, or more than the best of hay, for cattle. Grain ground and cooked saves one-third in feeding to all domestic animals."

The following estimate of the cost of cultivating an acre of corn is from Mr. David Bush, of Delaware Co., Ohio:

"Interest on land, $20 per acre	$1.20
One ploughing, with double team	1.00
Harrowing and working	0.75
Seed and planting	0.50
Working three times with cultivator	1.50
Hoeing once	0.60
Harvesting and husking	1.25
	$6.80

Average yield per acre, 48 bushels. Cost of production, about 14 cents per bushel."

From Xenia, Ohio, Mr. Alexander Ruff writes as follows: "The yellow varieties are most esteemed for distilling, and fattening stock; the white is preferred for bread and other purposes. The shuck is estimated at one-third the value of the blade. The blade, well saved, is about equal in value to second-rate hay. My experience in feeding ground grain to milch-cows is, that it is a saving of at least one-fourth, besides keeping the cows in better condition, and adding to the quantity and quality of milk. I have tried corn-meal cooked for fattening hogs, and estimate that one-half the quantity of raw corn fed to hogs would, if cooked, produce more pork. Corn is here considered a certain crop; and the cost of production is about 20 cents."

Mr. C. S. Chase, of Racine, Wisconsin, says: "*Dent* corn is much esteemed for its great productiveness. The length of the season here usually allows this variety abundant time to ripen. The husks and stalks are very little used for fodder. Corn should be ground and fed raw to cattle, and cooked for hogs. Had we a mill for grinding corn on our farms, we should use the meal altogether. A machine called a corn-grinder has recently been invented by Mr. Whitney, of this place. I have seen it in operation, and think it will prove of great value to farmers all through this country."

Mr. O. Perkins, of Burlington, Wisconsin, writes that "the cultivation

of corn is becoming a matter of prime importance with the farmers of Wisconsin, as well as of Illinois. It is a very certain crop, and 40 bushels per acre can be depended upon, except in the case of very late varieties, which are sometimes cut off by the frost. This happened in 1848, when a severe frost in the fall destroyed the vitality of some late kinds, which are too much cultivated in this State. This year the corn is all sound and heavy. The large southern varieties gradually become acclimated, after having been grown here several years in succession; and grow smaller and ripen earlier."

Dr. John Little, of Cass Co., Ind., sends us the following: "We have an almost endless variety of corn cultivated here. I prefer the *white flint* for sandy land, and the *yellow flint red-cob* for our rich river bottoms; the former being most esteemed for making bread, the latter as food for animals. Both are liable to change of character, if cultivated together, or near each other. The average product for several years, with me, has been 50 bushels per acre."

Mr. A. B. Florer, of Newport, Ind., says: "Notwithstanding the prejudice against it, there is more real value in corn, as food for man, and for fattening animals, than in any other grain. The *yellow* variety best suits our climate, (40° lat.) It ripens two weeks earlier, and comes to greater perfection, although it does not grow as large as some other kinds; average yield, about 50 bushels; weight, 55 lbs.; cost of cultivation, about $5.00 per acre."

Mr. John Bell writes from Floyd county, Ind., as follows: "Varieties here are very numerous, owing to their mixing, or hybridizing with each other, when in adjoining fields. The kind usually preferred is the *white flint*, large ear, deep grain, and small cob. This variety is best adapted to our climate, the seasons being long enough to bring it to maturity. Our earliest kinds ripen about the last of July, while later sorts require the whole season; the latter generally yield the best."

Mr. Wm. A. Hacker, of Jonesboro', Ill., writes: "Corn is our great staple here, on the verge of the 'American bottoms.' The quantity raised is immense, and is mostly shipped south to New Orleans, and thence to Europe. This season having been an unusually wet one, the yield will be indifferently good. 'A dry June' always results, in this section, in an abundant crop; produce per acre, from 50 to 75 bushels. The blade and shuck are not used to any extent here as fodder. Green corn, for soiling cattle, is very valuable, and produces more milk than any other feed, except green clover. My experience in feeding all kinds of grain, and especially corn, is in favor of having it ground instead of whole, and cooked instead of raw."

Mr. Charles F. Ingalls, of Lee Centre, Ill., says: "*Gourd-seed* is the kind most grown in this section; planted the last of April or first of May, 8 grains in each hill, and 4 feet apart each way. Hoe once, and run the corn-ploughs between the rows at least four times during the season; 40 to 50 bushels per acre the average yield. Grinding and cooking increase the nutriment, but for fattening *beef*, would not pay the trouble and expense. I think it would pay, however, for making *pork*."

From Scott Co., Iowa, Mr. James Grant writes as follows: "The *yellow-dent* is the most esteemed variety. It ripens three weeks earlier than the *gourd-seed*, and two weeks earlier than the *white-dent*. In this county we had, during the past year, about 15,000 acres in corn, which has produced 450,000 bushels, averaging 30 bushels per acre."

Mr. B. W. Hawkins, of Portland, Ind., says: "I have found steaming corn in the cob a good plan, and a saving of at least one-fourth, especially when fed to milch cows. The shucks are very valuable as fodder for cattle and horses."

MIDDLE AND SOUTHERN STATES.

Mr. R. L. Colt, of Paterson, N. J., says: "I use many acres of corn, sown broadcast and cut green, for my milch cows. I consider this a very valuable crop, as cows, oxen, and even hogs, eat the green stalks with avidity. If we have a thousand bushels of *corn*, we have also a thousand bushels of *cobs*. Now the question arises, Are these cobs of any value as food, or as manure? and if so, what is that value? One man tells me, they are of no account whatever. Another says, he can make as much whisky in December, from a pound of cobs, as he can from a pound of potatoes.—What we farmers want to know is, the nutritive value of the cobs, shuck, and blades; and I think an analysis of each part of the plant, and also of the ashes of each, is worthy of consideration, that we may restore to our land, in part at least, the materials extracted from it by the plant. This would prevent our soil from becoming impoverished by continual culture."

We would refer Mr. Colt, and others who may feel an interest in this very important subject, to the remarks on *Corn Culture* which follow these extracts, and also to the critical analyses of the different parts of the corn plant, by Dr. Salisbury, which will be found in another part of this volume.

Mr. Joseph M. Nesbit, of Union county, Pa., writes as follows: "This is one of the most important crops cultivated in this country, both in regard to profit, and the various useful purposes to which it is adapted. Of the many kinds cultivated here, we prefer the *yellow gourd-seed*, as it yields better than any other. In the selection of seed much care is requisite, in order to preserve this variety in its purity; as in this climate it seems very much to change its character and assume the characteristics of more northern varieties. The product of our good river bottoms will average 50 to 60 bushels per acre. The aggregate quantity produced in this part of the State has increased at least 30 per cent. in the last few years. This is to be attributed to the foreign demand, causing high prices, and inducing farmers to plant more land, and bestow more care and labor on its culture."

Mr. William Carr, of Doylestown, near Philadelphia, says: "My mode is to cut the stalks close to the ground—chop them fine by horse power, and feed them wet, and mixed with meal, bran, or roots, to milch cows."

Mr. William P. Morgan, of Princess Anne county, Va., writes: "Indian corn is the great reliance of Princess Anne farmers—and there has been for several years a considerable increase in the crop. Experience has proved that it is better adapted to our soil and climate than any other grain we can cultivate—average yield 20 bushels per acre. Norfolk is the market for this county."

Mr. Joshua Harris writes from Cabanis county, N. C., as follows: "The crop of 1849 surpasses any previous one made for many years; the season was remarkably favorable, and there was no want of rain from seeding time until the crop was completely made. I have heard of no failure in any direction. It order to secure a good crop and have it produce well, it should be planted four and a half feet apart each way, and in no case more than two stalks to the hill. Our most fertile lands produce 40 bushels per acre; but this is far above the average of the whole."

Mr. Henry C. Helm, of Lincoln county, Ky., says: "The large *yellow* is superior to the *white*, both for distilling and for fattening hogs. It matures 10 to 15 days earlier, thus allowing the farmer to commence feeding to stock that much sooner. I think there is more nutrition in the shuck than in the blade; both are valuable feed for all kinds of stock, especially for cattle and sheep. Ground food for horses and mules, and cooked meal for hogs, would save from $\frac{1}{4}$ to $\frac{1}{2}$ over the common method of feeding whole."

James Williams, of Jackson county, Ala., writes: "In this county corn is our principal crop—more was raised this year than ever before—planted from March until May—harvested from October to December—average yield about 40 bushels—cost of production about 25 *cents* per bushel. A large portion of the crop is consumed in fattening hogs. Pork is worth here about $2.50 per cwt.—20,000 hogs will this year be sent to market from this county."

Mr. E. A. Holt, of Montgomery, Ala., writes: "Corn is our great support for man and beast. A mixed variety of *flint* and *gourd-seed* the best—it ripens about the first of August. A man and horse on our rich prairie lands can make 500 bushels of corn per annum. Its cultivation has been increasing for several years past, but from the high price of cotton it is likely to decrease next year."

Dr. David L. White writes us from Florida, as follows: "After an experience of 27 years, I give a decided preference to the yellow, 12 to 16 rowed. The weevil is less destructive to this than any other kind, and it does well on a thin soil."

Mr. David Taylor, of Sevier county, Ark., says: "Corn should here be planted the first week in March. In this case we are certain of a crop, *rain or no rain.* But if the planting is delayed later, the chances are decidedly against us. *Gourd-seed* is here considered the best variety."

Mr. J. W. Calvert, of St. Francis county, Ark., says: "I have raised two crops of a kind new in this section, called the *Tuscarora.* The kernels are large, and of a reddish-white color, with a red cob. It is remarkable for the size of the ears, which are the largest I ever saw. I have several times thrown out from a pile 75 ears, as they came to hand, that produced a bushel of shelled corn. It is soft and easily crushed, and probably contains much starch, and but little oil; hence it would not be good for fattening animals."

Mr. Prior Lea, of Goliad, Texas, writes as follows: "South-western Texas is a good country for corn; but it requires deep tillage with the subsoil plough, on account of the heat and droughts. There is much difference in opinion as to the best varieties. The average produce per acre about 30 bushels; but more is often made as the first crop on prairie land. The average is increasing with improved tillage, and especially with deep ploughing."

CULTURE OF INDIAN CORN. (*ZEA MAYS.*)

Of the whole family of Cereals, *Zea mays* is unquestionably the most valuable for cultivation in the United States. When the time shall come that population presses closely on the highest capabilities of American soil, this plant, which is a native of the New World, will be found greatly to excel all others in the quantity of bread and meat, milk and butter, which it will yield from an acre of land. With proper culture it has no equal for the production of hay, in all cases where it is desirable to grow a large crop on a small surface.

The Report of the Ohio Board of Agriculture for 1849, for a copy of which we are indebted to M. B. Bateham, Esq., editor of the *Ohio Cultivator*, contains many interesting statements in reference to corn culture, made by the officers of numerous County Agricultural Societies. In Miami county, 2,030,670 bushels of corn were grown, at an average yield of fifty-five bushels per acre. Three varieties are cultivated: the common gourd-seed, for cattle; the yellow Kentucky, for hogs and distilling; and the white, for grinding and exportation. According to the returns from Greene county, which produced 1,250,000 bushels of corn in 1849, "a regular rotation of clover, corn, wheat, and clover again, is best for corn; and no crop pays better for extra culture."

The Harrison County Agricultural Society reports the pork crop at 4,800,000 pounds; and it gave its first premium for corn to Mr. S. B. Lukens, whose statement is as follows:

"The ground had been in meadow ten years; was ploughed six inches deep about the middle of April; was harrowed twice over on the 9th of May, and planted on the 11th, four feet by two feet. It came up well; was cultivated and thinned when ten inches high; three stalks were left in a hill. About two weeks afterwards it was again cultivated, and the suckers pulled off. About the last of June it was again cultivated, making three times the same way, as it was laid off but one way.

Expense of culture, gathering, and cribbing	$17.10
Product, 374⅜ bushels, at 31¼ cts.	117.10
Profit on three acres	$100.00"

The evidence on which a premium was awarded was such as should satisfy any one that three hundred and seventy-four bushels were grown on three acres of land, and at a cost not exceeding $17.10, delivered in the crib. This is producing corn at less than five cents a bushel.

Whether the statement be true to the letter, or not, it shows, conclusively, the great value of a *rich soil* for making cheap corn. The Board of Agriculture estimate the crop of Ohio last year at 70,000,000 bushels. Taking the United States as a whole, probably the crop of corn was never better than in 1849. One that has rich land needs only to plough it deep and well, plant in season, and cultivate the earth properly with the plough or cultivator, to secure the growth of a generous crop. On poor soils the case is very different.

To raise a good crop of corn on poor land, and at the least possible expense, requires some science, and much skill in the art of tillage. Take the same field to operate in, and one farmer will grow one hundred bushels of corn at half the cost per bushel that another will expend in labor, which is money. It unfortunately happens, that very skillful farmers are few in number, in comparison with those who have failed to study and practise all attainable improvements. Men who can grow maize on common soil, place the crop in a crib at from six to ten cents a bushel, and pay a fair price for the labor, need not go to school to learn the practical part of corn culture.

There are, however, five or six States in the Union in which this is done. Mr. Lukens has told us how they do it in Ohio; and the practice is very similar elsewhere.

To produce cheap corn on poor land, one needs a clear understanding of what elements of the crop air and water will furnish, and what they cannot supply. It should be remembered that the atmosphere is precisely the same over ground which yields one hundred bushels of corn per acre that it is over that which produces only five bushels per acre. Now the whole matter which forms the stems, roots, leaves, cobs, and seeds of corn, where the crop is one hundred bushels per acre, is not part and parcel of the soil. A harvest equal to fifty bushels per acre can be obtained without consuming over ten per cent. of earth as compared with the weight of the crop. No plant can imbibe more of the substance of the soil in which it grows than is dissolved in water, or rendered gaseous by the decomposition of mould.

The quantity of matter dissolved, whether organic or inorganic, during the few weeks in which corn plants organize the bulk of their solids, is small. From 93 to 97 parts of the dry matter in a mature, perfect plant, including its seeds, cob, stems, leaves, and roots, are carbon (charcoal) and the elements of water. It is not only an important, but an exceedingly instructive fact, that the most effective fertilizers known in agriculture are those that least abound in the elements of water and carbon. The unleached, dry excrements of dunghill fowls and pigeons have five times the fertilizing power on all cereal plants that the dry dung of a grass-fed cow has, although the latter has five times more carbon, oxygen, and hydrogen per 100 pounds than the former.*

Although it is desirable to apply to the soil in which corn is to grow as much of the organized carbon and water as one conveniently can, yet, where fertilizers have to be transported many miles, it is important to know that so much of the manure as would form *coal*, if carefully burnt, can best be spared. The same is true of those elements in manure which form vapor or water, when the fertilizer decomposes in the ground.

Carbonic acid and nascent hydrogen, evolved in rotting stable manure, are truly valuable food for plants, and perform important chemical offices in the soil: but they are, nevertheless, not so indispensable to the economical production of crops, as *available nitrogen*, *potash*, *silica*, *magnesia*, *sulphur*, and *phosphorus*. These elements of plants being less abundant in nature, and quite indispensable in forming corn, cotton, and every other product of the soil, their artificial supply in guano, night-soil, and other

* Oxygen and hydrogen form water, or are its elements.

highly concentrated fertilizers, adds immensely to the harvest, through the aid of a small weight of matter.

If a moiety of the elements of bread and meat, fruit and garden vegetables, annually consumed by the twenty-two millions of people in the United States, and then thrown away, were judiciously applied to the produce of grain crops, the yearly profits accruing would be many millions. In all sections where corn is worth thirty cents, and over, a bushel, great benefits may be realized by the skillful manufacture and use of poudrette. This article is an inodorous compound of the most valuable constituents of human food and clothing. It is the raw material of crops.

It is not necessary to restore to corn-fields all the matter removed in the crop, to maintain its fertility. A part of each seed, however, ought to be carried back and replaced in the soil, to make good its loss by the harvest.

In every barrel of flour or meal sent to market, (196 pounds,) there are not far from 186 pounds of carbon (coal) and the elements of water. When a bird eats wheat or corn, I have reason to believe, from several experiments, that over 80 per cent. of the food escapes into the air through its capacious lungs, in the process of respiration: and yet, the 20 per cent. of guano left, will reproduce as much wheat or corn as was consumed. Imported guano, which has been exposed to the weather for ages, often gives an increase in the crop of wheat equal to three pounds of seed to one of fertilizer: while it has given a gain of 7 to 1 of corn, and 50 to 1 of green turnips.

Chemists have ascertained that the air expelled from the lungs of man and his domestic animals in breathing, contains 100 times more carbonic acid than it possessed when it entered the organs of respiration.

While carbon, or coal, in bread, meat, potatoes, grass, hay, and straw, consumed by warm-blooded animals, is constantly passing out of the system as carbonic acid gas, the elements of water (oxygen and hydrogen) are also escaping from the lungs in the form of vapor, which in cold weather is often visible. Over 50 per cent. of the solids consumed by man and beast is thus thrown into the atmosphere by a slow, continuous combustion, which generates animal heat. These elements of the farmer's crops fall upon his cultivated fields in rain and dew. Hence, when a pig or other animal eats 100 pounds of corn, and voids by the bowels and kidneys 40 pounds of the matter consumed, these 40 pounds will reproduce 100 pounds of corn again. Even this 40 per cent. of the elements of corn may be reduced one-half by skillful fermentation, by which carbon and the elements of water are still further removed, and then reproduce an amount of grain equal to the original. The art and science of feeding cultivated plants being discussed at length in another place, the subject will not be pursued in this connection.

I am indebted to the valuable work of Professor Emmons, published in two quarto volumes, entitled "Agriculture of New York," for the following and many other analyses contained in this report. The researches into the chemical composition of maize were performed by Dr. J. H. Salisbury, in the laboratory of Prof. E., and were so thorough and extensive as to induce the New York State Agricultural Society to award a premium of $300 to Dr. S. His investigations fill 200 pages in the Vol. Transactions of that Society for 1848.

A corn-plant fifteen days after the seed was planted, cut on the 3d June, close to the ground, gave of

Water	89.626
Dry matter	10.374
Ash	1.354
Ash calculated dry	13.053

By the above figures it will be seen that nearly 90 per cent. of the young plant is water; and that in proportion to the dry matter, the amount of earthy minerals which remain as ash, when the plant is burnt, is large. This excess of water continues for many weeks. Thus on the 5th July, thirty-three days from planting, their relation stood thus:—

Water	90.518
Dry matter	9.482
Ash	1.333
Ash calculated dry	14.101
(Ash very saline.)	

Before green, succulent food of this character is fit to give to cows, oxen, mules, or horses, it should be partly dried. Plants that contain from 70 to 75 per cent. of water, need no curing before eaten. The young stalk cut July 12, gave over 84 per cent. of water. Such food given for soiling, without drying, would be likely to scour an animal, and give it the cholic.

The root at this time (July 12) gave of

Water	81.026
Dry matter	18.974
Ash	2.222
Ash calculated dry	11.711
(Ash tastes of caustic potash.)	

Ash of the whole plant above the ground, 6.77 grains. Amount of ash in all below the ground, 3.93 grains.

So late as July 26th, the proportion of water in the stalk was 94 per cent., and the ash calculated dry, 17.66 per cent. The plant gained 2136.98 grains in weight, in a week, preceding the 6th September. This was equal to a gain of 12.72 grains per hour.

The rapid growth of corn plants, when the heat, light, and moisture, as well as the soil, are favorable, is truly wonderful. A deep, rich, mellow soil, in which the roots can freely extend a great distance, in depth and laterally, is what the corn-grower should provide for this crop. The perviousness of river bottoms contributes largely to their productiveness of this cereal. A compact clay, which excludes alike air, water, and roots, forbidding all chemical changes, is not the soil for corn.

When farmers sell corn soon after it is ripe, there is considerable gain in not keeping it long to dry and shrink in weight. Corn grown by Mr. Salisbury, which was ripe by the 18th October, then contained 37 per cent. of water; which is 25 per cent. more than old corn from the crib will yield. The mean of many experiments, tried by the writer, has been a loss of 20 per cent. in moisture, between new and old corn.

The butts of cornstalks contain the most water, and the husk or shuck the least, when fully matured and not dried. The latter have about 30 per cent. of dry matter, when chemically desiccated.

Composition of the Ash of the Leaves, at different stages.

	July 19.	Aug. 2.	Aug. 23.	Aug. 30.	Oct. 18.
Carbonic acid	5.40	2.850	0.65	3.50	4.050
Silica	13.50	19.850	34.90	36.27	58.650
Sulphuric acid	2.16	1.995	4.92	5.84	4.881
Phosphates	21.60	16.250	17.00	13.50	5.850
Lime	0.69	4.035	2.00	3.38	4.510
Magnesia	0.37	2.980	1.59	2.30	0.865
Potash	9.98	11.675	10.85	9.15	7.333
Soda	34.39	29.590	21.23	22.13	8.520
Chlorine	4.55	6.020	3.06	1.63	2.664
Organic acids	5.50	2.400	3.38	2.05	2.200
	98.14	97.750	99.58	99.75	99.523

The above figures disclose several interesting facts. It will be seen that the increase of silica, or flint, in the leaf, is steadily progressive from 13½ per cent., July 19th, to 58.65 per cent., October 18th.

Flint is substantially the *bone-earth* of all grasses. If one were to analyze the bones of a calf when a day old, again when thirty days of age, and when a year old, the increase of phosphate of lime in its skeleton would be similar to that witnessed in the leaves and stems of maize. In the early stages of the growth of corn, its leaves abound in phosphates; but after the seeds begin to form, the phosphates leave the tissues of the plant in other parts, and concentrate in and around the germs of the seeds. On the 23d August, the ash of the whole stalk contained 19½ per cent. of phosphates, and on the 18th October only 15.15 per cent. In forming the cobs of this plant, considerable potash is drawn from the stalk; as it decreases from 35.54 per cent., August 16th, to 24.69 per cent., October 18th. When the plant is growing fastest, its roots yield an ash which contains less than 1 per cent. of lime; but after this development is nearly completed, the roots retain, or perhaps regain from the plant above, over 4½ per cent. of this mineral. Soda figures as high as from 20 to 31 per cent. in the ash obtained from corn roots. Ripe seeds gave the following results in their ash:

Silica	0.850
Phosphoric acid	49.210
Lime	0.075
Magnesia	17.600
Potash	23.175
Soda	3.605
Sodium	0.160
Chlorine	0.295
Sulphuric acid	0.515
Organic acids	5.700
	99.175

The above table shows a smaller quantity of lime than is usually found in the ash of this grain. It is, however, never so abundant as magnesia; and Professor Emmons has shown that the best corn lands in the State of New York contain a considerable quantity of magnesia. All experience, as well as all chemical researches, go to prove that potash and phosphoric acid are important elements in the organization of maize.

Corn yields more pounds of straw and grain on poor land than either

wheat, rye, barley, or oats; and it does infinitely better on rich than on sterile soils. To make the earth fertile, it is better economy to plant thick than to have the rows five feet apart each way, as is customary in some of the southern States, and only one stalk in a hill. This gives but one plant to twenty-five square feet of ground. Instead of this, three square feet are sufficient for a single plant, and from that up to six, for the largest varieties of this crop.

Much has been written in the agricultural journals of the country, on the propriety of thin and thick planting. Among the advocates of the latter system, Dr. M. W. Philips, of Mississippi, has been conspicuous, and is understood to be a successful grower of this great American staple.

If one has not a deep mellow soil on which to grow corn, it will pay well to form such a soil by deep ploughing, turning in green crops, and draining if necessary. Few farmers have ever made themselves rich by raising corn on poor land. There is vastly too much of unproductive soils ploughed and hoed in the United States. This practice is bad economy; for it impoverishes the earth, without enriching either the agriculturist or the community. It is so much better economy to grow 100 bushels of corn on two than on ten acres, that a general effort should be made to bring up all corn lands to the average of fifty bushels per acre.

A writer in the *Maine Farmer* estimates the quantity of southern and western corn annually imported into that state for home consumption, at 3,000,000 bushels. No other population, three times as large, out of the United States, consumes an equal amount of American corn. Maine is a great ship-building and lumber-producing State, which makes her an excellent customer for the grain and meat-growing districts of the Union.

The demand for ships, bread-stuffs, provisions, ready-made houses, farm implements, and wearing apparel of every kind, for the California trade and market is operating very sensibly on the agricultural interests of the country. The more its labor becomes diversified, the less danger there is of over-producing any one important crop, like that of corn, cotton, or wheat. It will not do for the productive industry of five millions of agriculturists to be constantly employed on a few leading crops, unless the design is to give a great deal of work for a very little pay, and impoverish the land at the same time.

CORN CULTURE IN MASSACHUSETTS.

CONWAY, MASS., *Dec.* 18, 1849.

SIR:—Your circular of July asking for information on agricultural subjects was put into my hands some months since. Not having the means of furnishing answers to many of its inquiries, I had concluded not to make any reply whatever. With this conclusion I am not entirely satisfied. I have been somewhat successful in the cultivation of *Indian corn* in common with several farmers of this town, and I propose at this late date to give you the mode of culture—with its results—the different varieties of corn in use here, &c.; of which you will make such use, or no use at all, as you see fit. And first, my own experience—premising that we live in a hilly country, and but a small portion of the land is suitable for tillage.

I have on my farm about twenty acres conveniently situated, and fit in all respects for tillage. Till the last twenty years, 35 bushels of corn was

considered an average crop per acre for this land. Now it is at least 75 bushels. This increase has been produced mainly by a rotation of crops, and by ploughing in long manure. The manure used is of two kinds.

First: Long manure. This is made from what remains of cornstalks and straw that cattle will not eat, and from *brakes*, mostly from the latter. These materials are used for litter under sheds where cattle and sheep are kept during the winter and spring, and become sufficiently decomposed for use before planting. It is important that this kind of manure should be ploughed under immediately after it is carted on the field, before it has become dry.

Second: Compost manure. This is made in June by mixing one part of stable manure (cow-dung) with two parts of swamp muck, in a large heap of 30 or 35 loads, keeping it under cover. Here it passes through a process of fermentation till November. It is then carted on the ploughed field, and laid in large heaps for use the next spring.*

The manner of cultivation is as follows: From two to three acres of that part of the twenty that produces the least grass, or as we say, "is bound out," is ploughed usually in August. The next spring harrowed, ploughed again from seven to nine inches deep, manured *in the hill* with compost, at the rate of 8 loads per acre, and planted. By a load, I mean 42 cubic feet, or one-third of a cord. The next spring this field has 20 to 25 loads of long manure ploughed in, 8 loads of compost put in the hill, and planted. The third year it is seeded to herds-grass (*timothy*) and clover with oats, or wheat and oats. By taking up from two to three acres annually of grass land, it will be seen that about one-third of the twenty acres is kept under the plough, and that when seeded down it remains in grass six or seven years; the planting is done between the fifth and twentieth of May; the rows three feet four inches apart, the hills two feet six inches. It is hoed three times, a cultivator first passing through the rows.

No hills are made in hoeing, and no weeds should be allowed to grow. I have usually "topped" it about the twentieth of September, and harvested the corn by cutting up the bottom stalks, during the last half of October.

The produce of the turf land—that is, the *first* crop—has been for several years from 60 to 70 bushels per acre. The crop the second year has usually been from 80 to 90 bushels. In some cases, as has been reported by a committee of the Conway Agricultural and Mechanical Association, over 100, and, in one instance, as high as 122 bushels of shelled corn per acre.

It ought here to be said, however, that the measurements of the Society's committee were made during the season of harvesting, and before the corn was sufficiently dry to be fit for market.

The corn is an eight-rowed variety, procured from Canada in 1835, or '36. The ears were small, not more than six or seven inches long—the cob *very small* and kernels large for Northern corn, consequently producing a greater proportion of shelled corn than most other varieties. The ear has gradually increased in size. It is now something more than one-third larger than it was in 1836. It does not ripen so early, but has never been injured by frost.

* Our correspondent commits an error in hauling his manure to the fields in the fall for spring use, unless he covers the heaps, however large, to protect them from washing and leaching rains, and water from melting snow.

This change in the size of the ear and in the time of ripening shows that climate has an influence on the character of corn.

I am aware that much larger crops are grown in many parts of the country. I give the result of my mode of culture—not because the crop is large, but because it shows how any farmer, with such fertilizing materials as his farm affords, may improve the quality and increase the produce of his lands.

I am aware too, that a better rotation would be—first corn, second wheat and oats—seeding with herds-grass and clover; third, grass two or three years; then corn again, and so on—being careful to turn under, before planting, a good supply of long manure. But this I cannot do for want of sufficient manure. Consequently the land remains longer in grass, the turf becomes more compact, requiring, after breaking up, two years' cultivation to make it sufficiently friable to lay it smooth for the scythe again.

The following is an estimate of the cost of cultivating an acre of corn two years, including cost of manure and interest on the value of the land. I fix the expense of labor high, as the estimate is based on the supposition that all parts of the work will be done in the best possible manner:—

First Year.

Interest on land at $60.00 per acre	$3.60
Ploughing twice	7.00
Eight loads of compost and putting in the hill	10.00
Planting and seed	3.00
Hoeing three times with cost of cultivating	7.50
Topping, harvesting, and threshing	9.00
Total cost of cultivation, &c.	$40.10

Produce.

65 bushels corn, 75 cents per bushel	$48.75
Fodder	6.00
Total value of crop	$54.75
Deduct cost of cultivation	$40.10
Profit per acre	$14.65

Second Year.

Interest on land, $60.00 per acre		$3.60
Ploughing once		2.50
Twenty loads long manure	$20.00	
Eight ditto compost	8.00	28.00
Carting manure		6.00
Planting and seed		3.00
Hoeing three times and cultivating		7.50
Cutting up stalks, harvesting, and threshing		10.00
		$60.60
Deduct one-half value of manure for future crops		14.00
Cost of cultivation and manure		$46.60

Produce.

Eighty-five bushels of corn, at 75 cents per bushel............	$63.75
Fodder..	7.00
Value of crop...	$70.75
Deduct cost of cultivation....................................	$46.60
Profit..	$24.15

I need not add that land treated in this way will produce a good crop of wheat and oats the next year, and large crops of grass for several years following.

I subjoin a statement of the amount of corn per acre raised by several farmers in this town in 1846—7, as reported by a committee of the Agricultural and Mechanical Association, for three years, omitting names, together with the fractional parts of the bushel.

To wit: for

1846.............134—132—111—110—103—96—92 bushels.
1847.............122—120—110—103 ditto.

I regret the report of 1848 is not at hand, as I think the crop was equal to any former year. This year there has been a great falling off in consequence of a severe drouth. It should be understood that the above measurements were made during the time of harvesting, and that from one-eighth to one-sixth should be deducted for shrinkage in drying. The mode of cultivation was substantially the same as that above described, excepting that in some cases the compost was spread on the surface and harrowed in, instead of being put in the hill. I ought to say that some of the largest crops were obtained by ploughing but once—spreading a heavy dressing of compost on the surface, and mixing it very thoroughly with the soil by harrowing; whether this permanently improves the soil as much as harrowing in long manure, may be a question.

The varieties of corn, besides the Canada corn above described, are the Cass corn, an eight rowed variety, and the Dutton corn. The weight of all these varieties does not vary much from 60 lbs. per bushel.

Very respectfully,
AUSTIN RICH.

Hon. Thomas Ewbank,
Commissioner of Patents.

GREEN CORN FOR SOILING COWS.

Methuen, Mass., *Dec.* 1*st*, 1849.

Dear Sir:—As I have been informed, other individuals from the county of Essex, better qualified than myself, have answered your circular, and as I answered several questions myself last year on the same subjects, I shall now merely refer to subjects on which I have tried experiments.

To ascertain the value of green corn for milch cows when compared with hay, I tried the following experiment. About the middle of August I com-

menced feeding my milch cows with English hay in addition to the feed of the pasture, which was short in consequence of dry weather. I weighed the milk of four cows for three successive weeks. The first week they were fed on hay, the second week two were fed on hay, and two on green corn, the third week those that were previously fed on corn were fed on hay, and those that were previously fed on hay were fed on corn.

Some of the cows were more fond of hay than corn: others again preferred the corn. Having carefully observed the manner of their eating and the weight of their milk, I came to the conclusion, that they would produce about the same quantity of milk. The hay used was cut early and of superior quality. If the hay had only been of medium quality, I think the corn would have produced the most milk. As corn can be easily cultivated, and will produce abundantly, I know of nothing (every thing considered) so valuable for soiling cattle in the latter part of summer and autumn as green cornstalks.

Again, you ask for information in regard to the comparative value of raw and cooked meal for feeding.

In 1842 I tried the following experiment to ascertain its comparative value for feeding swine. August 25, I put up five pigs, weighing as follows:

Pig No. 1	106 pounds	fed on	scalded meal.
" 2	81	"	" "
" 3	73	"	" "
" 4	110	"	raw meal.
" 5	99	"	" "

Three were fed on scalded meal, and two on raw meal; each pig was fed with the same quantity of meal, and consumed in 59 days 229 pounds of corn meal, to which were added each day about three pints of skimmed milk, with as much water as was thought necessary.

October the 19th, they were again weighed, and the result was as follows:—

Pig No. 1 weighed	170 pounds,	gain	64 pounds.
" 2	148 "	"	67 "
" 3	134 "	"	61 "
" 4	180 "	"	70 "
" 5	167 "	"	68 "

Those fed on scalded meal gained in 56 days on an average 64 pounds each, those fed on raw meal gained 69 pounds each. I then changed their feed; those previously fed on scalded meal were now fed on raw meal, and scalded meal was given to those that had been kept on raw meal: and instead of feeding them three times a day, as I had previously done, I fed them but twice a day, giving them, however, the same quantity of food, 166 pounds in 40 days.

November 28th, they were again weighed, with the following results:—

Pig No. 1 weighed	209 pounds,	gain	39 pounds.
" 2	183 "	"	35 "
" 3	182 "	"	48 "
" 4	213 "	"	33 "
" 5	207 "	"	40 "

In this case, the three pigs fed on raw meal gained in 40 days on an average $40\frac{2}{3}$ pounds each, and those fed on scalded meal gained on an average $36\frac{1}{2}$ pounds each; the result being in both cases in favor of the raw meal.

That there should be no mistake in regard to the above experiment, I fed them nearly all the time and weighed them myself.

Yours respectfully,
JOSEPH HOW.

Hon. Thomas Ewbank,
Commissioner of Patents.

SHEEP HUSBANDRY, WOOL, &c.

"What the prevailing races—what the condition of this branch of industry—amount of wool clipped in the year, and average weight of fleece of different races—cost of keeping sheep through the year per head—where your markets—what your system of selling—have you wool depots, and are they found advantageous for wool grower and manufacturer—what number killed by dogs in your State." [*Circular.*

Mr. Geo. W. Drisko, Washington Co., Maine, writes thus: "There are a number of flocks of Merino and Saxony sheep in this county, which produce considerable quantities of wool; average weight of fleece 3 lbs., price 37½ cents. Estimated number in this county, 4000; probably seven per cent. are annually destroyed by dogs, wolves, and bears. Most of the wool is sold or exchanged for cloth at the woolen factories in the western part of the State, or disposed of to the agents of these manufactories throughout the eastern counties."

Mr. Isaac Hubbard, of Claremont, N. H., says: "We have very few full-blooded Merino and Saxony sheep; but they are mostly crosses of these with native breeds. This branch of husbandry rather flags in this section. Many of our farmers are discouraged, and are getting rid of their sheep as best they can, selling them for their pelts, or killing them for mutton. The cause of this is that cattle-breeding is found much more profitable than raising sheep. Hence farmers are selling off their flocks of sheep, and are going more extensively into the breeding of cattle for the Brighton Market. The cost of keeping sheep through the year is about one dollar per head; and from 2½ to 3 lbs. is the average clip. Several wool depots have lately gone into operation, and are spoken of very favorably, as equalizing the price according to the quality of the wool."

From Hydepark, Vt., Mr. Ariel Thurston writes as follows: "In this State there are many flocks of pure Merino and Saxony sheep; and increased attention has of late been paid to this branch of industry. Cost of keeping, about one dollar per head—average clip, native 3 lbs., Saxony 2½ lbs., Merino 3½ lbs. Quantity of wool clipped in this county estimated at from 27,000 to 30,000 lbs. There are no wool depots in this section, although several have been established in the State. Most of our wool is sold to manufacturers and their agents, in this and the adjoining States. But few sheep are killed by dogs, under the existing stringent laws on this subject."

Mr. Samuel Wells writes from Northampton, Mass.: "The number of sheep in this State has probably diminished for some years past. The introduction of Saxony sheep and crossing them with Merinos has increased the fineness of the wool, but has rendered the sheep more feeble and more subject to diseases, and has also diminished the average weight of the fleece. These facts, together with that of raising sheep at half the expense in the Western States, has caused a decline in this branch of industry."

Hon. J. D. Patterson, of Westfield, Chautauque county, N. Y., writes as follows: "The condition of this branch of husbandry is not as promising as it formerly was; the prices of wool for two years past having been too

low to afford the wool grower a fair remuneration. The land in this county is as well adapted to dairy purposes as to wool-growing; and as the former business is the most profitable, it has been largely increased, to the neglect of the wool-growing interest, which has probably decreased in the same ratio. The amount of wool clipped in this county during the past year is about 400,000 lbs.; and the average weight of fleece varies, in native breeds from $2\frac{1}{4}$ to 3 lbs., Merinos from 3 to 4 lbs., Saxony from $1\frac{3}{4}$ to $2\frac{1}{2}$ lbs. The cost of keeping sheep through the year is from $1.00 to $1.25 per head, depending much upon the season. Our market for wool is in the villages and large towns, where it is mostly bought by manufacturers and speculators. But few sheep are killed by dogs—probably not over one per cent. I have a flock of about 550 pure blooded Spanish Merino sheep, which will average over 5 lbs. of wool each—worth at this time 40 cents per lb. I have also a pair of Merino sheep one year old, which were imported from France. The buck sheared the present year $14\frac{1}{2}$ lbs., and the ewe 10 lbs. 10 oz., thoroughly washed wool, samples of which I send you enclosed."

Mr. J. L. Merreck writes from Delaware county, N. Y., as follows: "This branch of industry, once quite prosperous, has been greatly discouraged by the tariff of '46—which so much reduced the price of wool and cloths. The prevailing races here are the Merino, Saxony, and Southdown. The two first are raised for wool, the last named for mutton. Average clip per head, Saxony $2\frac{1}{2}$ lbs., Merino, pure and mixed breeds, 3 lbs., Southdown 3 to 4 lbs. Cost of keeping, about $1.00 a year, per head."

Mr. Alexander Ruff, of Xenia, Ohio, says: "We have a few pure blood Merino and Saxony sheep; but the great mass are a cross of the fine wooled with the common sheep of the country. The clip is about 3 lbs.; and the price about 25 cents on an average. Our wool is principally sold to dry goods merchants, or exchanged for cloths; and I do not think we realize the cost of production. This branch of husbandry, when considered in its most favorable light, affords but a very small profit to the farmer."

Mr. Rufus Coats, of Allen county, Ohio, appears to take a different view of wool-growing in the Buckeye State from that expressed by Mr. Ruff. He says: "I consider this a profitable branch of business in the western part of Ohio; and so far as my knowledge extends, I think it is increasing in popularity. The common breeds are the Merino and Saxony. I prefer a cross of the two for improving the quality of the wool. Average clip, 3 lbs. Cost of keeping, $1.37 per head."

Mr. Charles F. Ingalls writes from Lee Centre, Ill., thus: "Sheep do well in this section, if pastured; or if they have upon the prairie a shepherd to keep off the wolves. Breeds not much improved, but most lots of wool will average from $\frac{1}{2}$ to $\frac{3}{4}$ Merino. The business of wool-growing is improving; and we are much in want of factories to work up the raw material into cloths."

Mr. Origen Perkins, of Racine county, Wis., says of sheep husbandry in that State: "Many flocks have been brought here of fine Saxony and other breeds. They are healthy and thrive well, and sheep would be very profitable stock but for the ravages annually made among them by dogs. Until very recently, most of our fine wool was sent East; but now our farmers find a home market, as several woolen factories have been put in operation in different parts of the State. Sheep can be kept on our prairies at a trifling expense in summer, and in winter they thrive well on prairie hay. This must eventually become an important branch of farming in this State."

Mr. Benj. Whitfield, of Tuscaloosa, Ala., writes thus: "In this branch of husbandry we lack every thing but climate and soil: and these are perhaps not surpassed by any section of the country in the same latitude. Nowhere is land cheaper, nowhere is there a drier climate, or one less exposed to sudden changes. Sheep can be wintered here for 25 cents per head. Any stimulus which can be given to wool-growing will be an important step towards the improvement of the country."

Mr. Pryor Lea, of Goliad, Texas, writes as follows: "We have at present but few good sheep in the country; they being principally of the Mexican breeds, which are very inferior. The cost of keeping is little more than herding, not over 25 cents per head. I think south-western Texas the best adapted to raising sheep and wool-growing of any part of the United States."

WOOL GROWING, WOOL DEPOTS, &c.

KINDERHOOK, NEW YORK, *January* 15, 1850.

SIR:—A circular from your office has recently been handed to me by Dr. J. P. Beekman, of this town, in which sundry questions are propounded on the subject of sheep husbandry, with the request from him that I should prepare some statements with reference to the subject; but more particularly in relation to the question, "Have you wool depots, and are they found advantageous for wool grower and manufacturer?"

1st. "*What the prevailing races.*"—Each of the different varieties of sheep grown in the United States may be found in the State of New York. Wool growers located in the vicinity of our large cities and towns, who have heretofore bred fine Saxony sheep, have to a great extent within the past five years changed their flocks for large-framed, coarse-woolled sheep, whose carcasses are valuable for mutton; and they derive a greater profit from the Leicester, Southdown, and Cotswold sheep, and their crosses with the native and other breeds, by the sale of mutton and wool, than from the sale of wool alone from the finer grades of Saxony and Merino. Yet the most enterprising wool growers in this State are breeding the Saxony and Merino sheep, and many are crossing the two varieties, which cross gives the grower a fleece weighing from three to three and a half pounds of wool. With the foregoing exceptions, Merinos and their grades are the prevailing races.

2d. "*What the average weight of fleece of different races.*"—The average weight of fleece of large flocks of the full blood Saxony breed is about 2½ pounds; of the full blood Spanish Merino, 4 pounds; of the cross of Saxony and Merino, 3¼ pounds; of the grades of Merino and native cross, 3 pounds; and of the Leicester breed, about 5 pounds. J. A. Taintor, of Hartford, Conn., has recently imported a variety of Merinos from France, which are large, well-formed sheep, and from which flocks may be reared producing fleeces weighing 7 pounds of medium quality of wool washed on the back. I have seen one fleece, 16 months growth, which contained 14 pounds of wool, well washed before shearing. Messrs. Smith and Catlin, of Litchfield county, Conn., have, within the last year, imported a race of Saxony sheep, which, judging from the specimens I have seen, will yield larger fleeces of a superior quality of wool than most of the former importations introduced into this State, yielding 3 pounds per fleece in the ordinary mode of washing.

3d. "*What is the cost of keeping sheep through the year, per head?*"—Assuming the fact, which is verified by our most enterprising agriculturists, that the keeping of sheep upon grain-growing lands greatly increases the fertility of the soil, it may safely be estimated that 70 sheep may be kept upon 100 acres of cultivated grain land without diminishing the grain crops, but, on the contrary, increasing them. Various estimates have been made of the cost of keeping sheep in this state—much depending upon the price of hay, aside from its value for feeding on the farm for increasing manure, and the value of lands adapted to pasturage. From 2½ to 3 per cent. of the weight of sheep per day will be found sufficient through the foddering season.

4th. "*What is the condition of this branch of industry?*"—The condition of this branch of industry is not improving so rapidly in this State as in the Western and Middle States. Large numbers of sheep are annually driven from this State to supply the demand from the West. The high prices of butter and cheese for the past five years have led to substituting the dairy for sheep husbandry in many districts; and yet since 1840 there has been an increase in the production of wool. The clip in 1840 was, according to the statistics accompanying the census, 9,845,245 pounds—in 1845, 13,864,828 pounds. Estimating the last mentioned quantity at 35 cents per pound, and which is believed to be a fair one, it amounts to $4,742,689; and when there are added to this the sales of sheep and lambs for mutton, the annual value of this branch of agricultural industry assumes an importance worthy of attention. Every thing calculated to foster and sustain this interest in the hands of the farmer, should be carefully considered. It is of the utmost importance that he should be informed of every improvement that is being made, by which he shall be secured the full value of his wool. Hence it is not only necessary for him to investigate principles relating to the breeding of sheep, (in order that he may be successful in producing that kind which is most profitable,) but what is equally important for him, so to investigate the present system of the wool trade as to enable him to determine whether his success is not equally dependent upon a change in that system as upon improvements in his flock. I shall confine myself chiefly to the necessity for such change, and the remedy proposed by establishing wool depots: and only allude to such facts in breeding and keeping sheep as appear to be necessary to rightly understand this branch of the subject.

Much discussion has been had to show which was the most profitable, whether Saxony, a cross of Merino and Saxony, Merino, or large-framed, coarse-wooled sheep, whose carcasses are suitable for mutton. The success attendant upon the growth of each kind appears to have depended upon the skill and management of the grower, and the facilities enjoyed for the sale of the wool or carcass.

Those residing near cities or large villages, or possessing easy facilities for reaching these places, may find large-framed, coarse-wooled sheep, to a *limited* extent profitable; but such is not the fact in regard to the great mass of wool growers in the United States. The profits arising from their flocks must result from the wool, or from the sale of sheep made valuable, by the skill of the breeder, for their superior fleece.

Where the facilities for selling have been such that the intrinsic value of the fine fleece could be obtained, I think I am not hazarding too much by saying, that the profits arising from the growth of fine wool have been

greater than on the lower grades. But where these facilities for selling have not been enjoyed, the profits have been in favor of the grower of medium and low qualities. As a proof of this, reference may be had to the fine wool grower in those sections of the country where, by reason of their superior clips and large flocks, great inducements were held out to fine wool purchasers to visit them for the purpose of buying; and thus a competition was created, which resulted in fair prices; while in other sections, where equally as fine wool was produced, but in less quantities, or where the low, medium, and high grades were grown promiscuously, those producing the fine qualities have been under the necessity of selling their fine wool at 2, or 3, or at most 5 cents only, above the price paid for the common or low grades, and that too when the superior condition of the fine fleece alone, independent of its quality, would make that difference: thus sustaining a loss of all their skill, care, and expense, in breeding fine instead of common or medium wools.

5th. "*Where are your markets?*"—Until the commencement of the year 1845, no general system for the selling of wool had been adopted in this country. Some wool growers carried their clips directly to the door of the manufacturers, and accepted the price which was there offered; others awaited the arrival of the manufacturer, or his agent, to negotiate sales at their own doors; some depended on the country merchant as a purchaser, who bought to sell again; others upon the wool dealer or speculator, who would buy if the margin in the price promised a good profit; some forwarded their wool to the large cities to be sold at commission houses. The wool thus found its way to the loft of the manufacturer through a variety of channels, with one or more intervening profits after leaving the hands of the grower.

At the meeting of the N. Y. State Agricultural Society, held at Poughkeepsie in the fall of 1844, the inequality of prices obtained by the diversified modes of selling wool induced Dr. John P. Beekman, then president of the Society, and other leading agriculturists of the State, being themselves extensive wool growers, to devise the plan of selling their clips through the medium of a wool depot.

One of the prominent causes of the success of the European manufacturers of woolen fabrics may be found in their ready access to wool dealers and staplers, where a nice discrimination is made in classifying the various styles and qualities of wool, which enables them to select that which is exactly suitable for the goods they wish to produce.

The principles involved in this system are not new, it being conducted upon those of a commission business; but it is only the details and application of these principles to wool, when received direct from the grower, that had never before in this country been applied in the same discriminating manner, and with as little expense as by this system.

By the classification and arrangement of the fleeces, facilities are given to the manufacturer to purchase, in an intelligent manner, the style and quality best adapted to his goods, while at the same time the grower's interest is protected by the different grades being offered for sale to such, and such only, as required them.

Upon the delivery of the wool at the depot, each lot is weighed, and a receipt given to the owner for the amount. The fleeces are then carefully examined and classed according to their quality; each class or sort is weighed, and a record made of the weight. It is then examined with refer-

ence to its condition. If any portion of the clip is found to be unwashed, or partially washed, or to contain filth, tags, or other substance inside of the fleece, except well-washed wool, a discount is made upon the weight of such fleeces, a record is made of this discount, and it is charged to the owner, and allowed to the manufacturer or purchaser. The fleeces, when thus classed, compose a sort of equal value in quality and condition. When there is any thing in the style or condition of the wool which renders it of more than ordinary value, or if the owner wishes, it is kept separate from the other clips, after being sorted. The various sorts are known by the following designations: Super, Extra, Prime, No. 1, No. 2, No. 3, De Laine No. 3, No. 4, De Laine No. 4, No. 5, and long combing.

There are few flocks, however carefully bred, which will not embrace three or four of the above-mentioned classes—many six or even eight of them. Hence the wool grower under the old system, when disposing of his wool to a manufacturer using the lower grades, must expect that such a price only will be offered for his whole clip as the lower grades are worth; and the fine wool manufacturer will not become a purchaser unless a large proportion of the clip is of a quality suited to his purpose. It will readily be seen that these difficulties may be obviated by a judicious classification of the fleeces. The following statement will show the usual relative value of the different sorts, and the uses, in part, to which they are applied. The prices here mentioned for the finer qualities are taken from the highest range of the present year. For the lower qualities there has been an unusual demand, and prices have ranged higher. No. 5, which is the coarsest grade, and used for making coarse satinets, baises, and the coarser kinds of heavy goods, 25 cents; No. 4, used for low flannels, satinets, and ¾ cloths, 28 cents; No. 4 De Laine, used for a medium kind of worsted goods, 29 cents; No. 3, used for flannels, medium cassimeres and satinets, and low-priced broadcloths, 31 cents; No. 3 De Laine, used for mousselin De Laines, and other combing purposes, 32 cents; No, 2, adapted to fine fancy cassimeres and medium broadcloths, 35 cents; No. 1, used for similar purposes, 39 cents; Prime, 44 cents; Extra, 50 cents; Super, 60 cents; another quality may be selected from the Super, called Super-super, worth 75 cents. These high grades are used for the finer qualities of cassimeres and broadcloths. The difference between Nos. 3 and 4, and the De Laines or combing qualities of the same Nos., consists in length and strength of staples, and not in the fineness of the fibre. As a further illustration of the relative value of wool, we may take the standard applied in 1846 and '47 by some of the large manufacturers of fine wool to their sorts, after the fleeces have been parted on the stapler's bench. Two examples will be given, with the name and price of each sort: Super, 80 cents; Extra, 65 cents; Prime, 52 cents; No. 1, 44 cents; No. 2, 38 cents; No. 3, 33 cents; No. 4, 28 cents; No. 5, 25 cents; Listing, 20 to 22 cents.—Extra, 90 cents; Picklock, 75 cents; No. 1, 63 cents; No. 2, 53 cents; No. 3, 45 cents; No. 4, 38 cents; No. 5, 32 cents; No. 6, 27 cents; No. 7, 23; and Listing, 20 cents. I have invariably found it the case that the fine wool manufacturer attaches a much higher value to the fine qualities in his sorts, than a manufacturer of medium wool would to the same quality of wool; also, that the manufacturer of low and medium qualities attaches a higher value to the low qualities, than the fine wool manufacturer does to wool of the same grade. Few if any of the manufacturers of low or medium goods reach a point in the stapler's scale above 50 cents. They

usually make a less number of sorts, and estimate about 5 cents difference between each.

It needs no argument to show that the manufacturer of fine broadcloths, cassimeres, satinets, flannels, or worsted goods, can at a depot select such wools as are exactly suited to his peculiar style of goods, without being under the necessity of purchasing a single fleece he does not want; and that with such facilities, it is for his interest to pay a fair market price, according to the relative value of the style or quality he wishes to work; and furthermore, that he is not paying for filth concealed in the inside of the fleece, instead of wool.

It is for the interest of the wool grower, as well as the manufacturer, that they should be brought together with the least possible expense, and in a manner that the improvements or frauds of the one should not escape the notice of the other. I have the opinion of several manufacturers, who certainly ought to be competent judges of the fact, that full five cents per pound intervenes when the wool finds its way from the grower to them through the ordinary channels of trade; whereas, under the depot system, one and a half cents per pound will cover all expenses for receiving, insuring, sorting, storing, and selling.

Those who have been the friends and supporters of this enterprise, by annually depositing their clips, find that it affords an excellent opportunity of having it examined by a competent judge, and its merits or defects pointed out; and by comparing it side by side with other clips, to learn the true character and value of their wool. Again: the depot forms a kind of *exchange*, at which place during the season for depositing wool the growers may meet and compare views, communicate and receive information concerning the improvements each has made, and from the books of the agent determine, from the sorting of the different clips, and the prices obtained for each, which is most profitable; and also where those flocks which produce the style of wool they wish to grow, are to be found. Other duties may prevent the farmer from bestowing as much time as is necessary to procure that information which is essential to become a successful grower of wool. It very naturally falls within the range of the duties of the agent of a depot to collect just that kind of information most needed, and from his records it is easily conveyed to the wool grower.

It may readily be seen, from what has been said, that in order to insure the successful prosecution of the depot system, large quantities of wool must be deposited in one place; for unless this be the case, a sufficient quantity of each sort cannot be obtained to make it worth the attention of a manufacturer to visit a depot and make his own purchases.

The question naturally arises,—Will the manufacturer approve of this system in making his purchases? Knowing them to be a shrewd, cautious, and enterprising class of business men, before deciding upon the feasibility of the depot system, I visited many of the most prominent manufacturing establishments, and after presenting the object I had in view, received from them assurances that it met with their cordial approbation. I also received from them much valuable information in regard to the relative value of their sorts, the adaptation of the various styles and qualities of wool to the different kinds of goods manufactured, which it would have been difficult to procure from any other source.

It is now five years since the first wool depot was established in this country. The approbation of manufacturers has been manifested by their

purchasing all the wools deposited with me at their full market value. An annual increase of the quantity received, in the ratio of fifty per cent. per annum, justifies the conclusion that it meets with the entire approbation of the enterprising wool growers.

The position is assumed by some, and with a degree of plausibility, that were a large portion of the wool growers to turn their attention to the growth of fine wool, the market would be overstocked, and consequently prices decline; but we live in an age of improvement—our manufacturing and agricultural interests are not behind the spirit of the age. The woolen manufacturers of this country, by reason of their enterprise, skill, and long experience, and the improvements in machinery, are rapidly progressing towards that state of perfection in their goods which will enable them to compete successfully with the foreign manufacturer. This will lead to a continually increasing demand for such qualities of wool as are adapted to the making of fine cloths and other superior fabrics. The process of raising the standard of the character of a low grade flock, is slow and tedious: and I have no doubt that after a quarter of a century spent in trying the various improvements suggested within that time, we are only approximating towards that high degree of excellence in our flocks as a *whole*, which is to be found in some of the choice flocks of Europe. Yet our improvements have been so great as to justify the assertion that as fine wools can be grown in the United States as in any other part of the world.

The supply of wool grown in this country is far below the demand for home consumption. About eighteen millions of pounds of wool were imported in 1849, to supply this deficiency. A large additional quantity will soon be wanted to manufacture such fabrics as are now wholly supplied by foreign manufacturers, and which the ingenuity and enterprise of our citizens will soon produce. Within the last ten years from three to five millions of pounds per annum have been used in the fabrication of two descriptions of goods, which were previously imported from Europe. With a soil, climate, and herbage as well adapted to the growing of wool as any other part of the world, no good reason can be adduced why the skill and capital of our enterprising agriculturists should not meet with a reward as great as that which has crowned the efforts of the cotton planter; and taking into consideration our great extent of territory, the day is not far distant when the value of wool exported from this country will approximate somewhat that of cotton, though it may never equal it.

"*The effect produced on wool by keeping of sheep.*"—The condition of the animal should be uniform from the time of one shearing until the next. If this is not the case, the effect upon the wool will be injurious; for while the sheep is *fattening*, the wool will be of a grosser growth, and the fibre larger; and when it has become *poor*, the growth will be less vigorous, and the fibre smaller; and you have this result (which will readily be discovered by a practical eye in examining a fleece)—two qualities of wool in the same fibre. I have seen flocks which were well kept for six months after shearing, and then run down in flesh and remained poor until the next shearing, where the outer end of the staple was one full quality in fineness below the inner end; also when the animal had been well kept at the beginning and end of the year, but poorly kept and run down in the winter, the middle of the fibre showed the same difference.

This not only reduces the quality of the wool in the stapler's scale to the lowest and coarsest grade in the fibre, but also makes the fibre weak and ten-

der in the fine part grown when the animal was poor. The result of bad keeping, also, often injures the health of the sheep, which, in addition to the evils spoken of, gives the wool a knotty appearance and a tightness of the fleece. When the condition of the sheep is good, and they continue vigorous and healthy during the whole year, the fibre of the fleece will be free and uniform in quality, and the fleece heavier and more valuable, than when they are alternately changing from a high to a low state of flesh. *The fineness of the fibre should be produced by the high blood of the sheep, and not by poor keeping.*

"*On washing and shearing.*"—Before turning out to pasture in the spring, the sheep should be well tagged, care being taken to remove all the locks of wool that would be likely to retain filth. Very early washing often proves injurious; and especially is this true in regard to fine-wooled sheep. It should be delayed until the warm weather has fully commenced, which is usually not until June, when the water becomes sufficiently warm to facilitate the removal of the filth from the wool. Too early washing and shearing often expose the sheep to cold storms and the chilly effects of cold nights, without the necessary covering provided by nature for them; while too late shearing exposes them to the rays of the hot burning sun before the new growth of wool has attained a sufficient length to shield them from its effects.

The manner of washing sheep must necessarily vary, for all have not equal facilities. Pools of stagnant water should be avoided. Better not wash at all than have your flocks poorly washed; for if not washed, you arrive at the value of the fleece, compared with clean wool, by a well known and established rule of discount. The best mode is to use a running stream, or vat with a stream of water, having a fall of a few feet, running into it.

Just previous to washing, the sheep should be thoroughly wet without squeezing the wool, and suffered to stand crowded together for a few hours, until the soapy substance and oil or gum which the wool contains, unite; when again taken into the water and the wool squeezed with the hands, the whole of the filth readily separates from the wool, and passes off with the running stream. In the common mode of washing, the soapy substance first passes out of the wool, only partially uniting with the oil and gum, after which it is impossible to remove the gum, no matter how much time may be spent in washing. Care should be taken to wash the fleece thoroughly in all its parts. I have seen frauds attempted to be perpetrated by washing the back and sides, and leaving the belly and skirts unwashed, which in rolling up the fleece were carefully concealed. After washing, the sheep should be suffered to run in a clean green-sward pasture a sufficient length of time for the wool to get dry, which is usually in four or five days, and then shearing should commence. Very large flocks should be divided, and the washing done at different times, or they will run too long before being shorn. The place assigned to the flock when collected for shearing should be well littered with straw and kept clean, so as to prevent the filth, consequent upon their being close together, from getting upon the wool. In shearing, great care should be taken to keep the fleece whole. Each clip of the shears should sever a part of the wool from the sheep, and a second clip either on that part of the animal, or on the part of the fleece just severed, should be avoided; for clippings thus made are useless, and a total loss.

After shearing, the fleece should be removed to a table, or clean smooth place on the floor, with the inner part down; then gathered up into as com-

pact a condition as it occupied when on the sheep; the sides of the fleece should be then folded over so as to meet on the back of the fleece, the head and neck thrown back so as to make the fold upon the shoulder; next be folded or rolled from the butt of the fleece, and continued until you reach the shoulder. The fleece should then be snugly tied with a small, smooth twine, passing around two, or at most three times. You thus have a compact fleece, easy to open, and the shoulder, which is the finest part, on the outside. Buyers always expect to see the *best side out*, and wool growers sometimes do themselves injustice by not thus exhibiting their fleeces. I do not believe that the manufacturers, as a whole, in this country, are yet prepared to pay a sufficient advance beyond the present prices, to justify the growers of wool in removing all of the fribs, belly locks, and skirts from the fleece, as is done with the fine wools of Germany. I would therefore at present put inside of the fleece all the well-washed and clean wool shorn from the sheep; carefully excluding all such locks as are filthy, or below the residue of the fleece in condition.

For fear of extending this communication to too great a length, I would refer your readers to the prize essay on this subject, written by the Hon. Daniel S. Curtis, and published in the transactions of the New York State Agricultural Society for 1848, pages 245, etc. This essay contains many valuable hints on the subject of sheep husbandry.

Respectfully, yours,
H. BLANCHARD.

Hon. Thomas Ewbank,
Commissioner of Patents.

SHEEP, WOOL, AND WOOL DEPOTS.

Buffalo, N. Y., *December 3d*, 1849.

Sir: I received from you some months since a circular, requesting information upon various subjects connected with agriculture; one branch of which, sheep husbandry, I have selected for an answer. I will reply to each question under this head separately, making my answers somewhat more general than your circular proposed. Having established a wool depot at this point three years ago, I have been enabled to become pretty thoroughly acquainted with the condition of sheep husbandry in the Western, as well as this and the Eastern States. First:

"*What are the prevailing races?*"—It is impossible to define the races of sheep in the Union by any distinctive names. In particular sections, sheep of pure Saxony and Merino breeds may be found, as also of the Southdown and Cotswold. Generally, however, the great mass of sheep are grades between the Saxony and Merino, and the common coarse-wooled sheep of the country. Very little wool is brought to market now, except from Canada, that does not show, to a greater or less extent, the effects of a cross with fine-wooled sheep. There has not been sufficient encouragement given by manufacturers to induce farmers to grow very fine wool, and it will be a long time before our flocks will generally produce fine wool, or fleeces of uniform fineness.

"*The condition of this branch of industry.*"—The condition of this branch of farming is prosperous. Wool has not, it is true, brought as good

prices for the last two years as it has years before; and owing to peculiar circumstances, not so good in proportion as other farm products. But the depression will only be temporary: for already has the price of grain and of the products of the dairy fallen to that point that renders wool-growing now, and will for years to come, the most profitable as well as the most reliable branch of farming. The uncertainty of the wheat crop in many of the Western States will drive the farmers to wool-growing much sooner than they would otherwise engage in it. And they will find that money can be made very easily, and with a certainty they have never known in grain culture. The transportation of bulky articles like grain, which are of little value compared with their cost of carriage, will always commend wool-growing to the farmer who lives at a distance from market. The cost of transporting a bushel of wheat from the Ohio or Mississippi river to this market would average 12 cents under the most favorable circumstances, and would sell on an average for about 70 cents; while the cost of transporting a pound of wool from any point west to this depot would not exceed three-fourths of a cent, and will bring on the average 25 cents.

The facilities for raising sheep are so great, and the advantages so apparent, that at no distant day, the amount of wool grown in the Western States will form no inconsiderable item in the agricultural resources of the people. When circumstances are favorable to the rapid increase of sheep, as the high price of wool, and low price of grain and dairy products, they increase at the rate of about 25 per cent. in four years.

"*Number of sheep, and amount of wool clipped this year.*"—The best data on this subject are furnished by the last census of the United States, and of the State of New York made five years after. The whole number of sheep in the United States, as shown by the census of 1840, was 19,311,374; and the amount of wool shorn was 35,802,114 lbs. Of the sheep, about one-fourth were under the age of one year; leaving, therefore, about 14,500,000 as the number shorn. This would give $2\frac{1}{2}$ lbs. as the average weight of fleece; which is below the average in this State, as shown by the census of 1845. The average here was 3 lbs.

The increase of sheep in this state, from 1840 to 1845, was as follows:

1845	6,443,855
1840	5,118,777
Increase in 5 years	1,325,078

a fraction over 25 per cent.

Increase of wool during the same time was:

1845	13,864,828
1840	9,845,295
Increase in 5 years	4,019,533 lbs.

This shows that the increase of wool was equal to the general average per head in this State, of three pounds.

Allowing for the same ratio of increase as is shown in this State, the whole number of sheep in the Union in 1845 would be almost twenty-four millions. Of these, eighteen millions would be over one year old, so that the clip that year was, at $2\frac{3}{4}$ pounds per head, about fifty millions of pounds. The whole number of sheep in the Union in 1850 will not vary much from thirty millions, which, upon the above data, will give about seventy million

pounds of wool for the clip of that year, or a trifle over three pounds for each inhabitant of the United States.

"*Average weight of fleece of different races.*"—It is next to impossible to give any satisfactory answer to this branch, as so much depends upon the method of washing, the time of shearing, and the accuracy of weighing. Sheep of Merino blood, or when that blood preponderates, will shear upon an average 3¼ lbs. wool washed upon the sheep, and shorn as soon as dry: while the Saxony and crosses of that breed will shear but about 2¾ lbs. of wool equally well washed. There is, however, a very perceptible difference in the locality of keeping the sheep, as to the weight of fleece. The fleece of the same sheep driven from this State or the Eastern States to the West, and kept equally well or even better, will not weigh as much by an average of one-fourth of a pound. Though the wool is by that much better to the manufacturer, for the loss is in the animal oil, and gum, which has been cleaner taken out of the wool by the alkaline nature of the fine dust of the prairies that was mingled with it before washing.

The weight of medium grade fleeces will not vary much either way, and for all practical purposes it will be safe to assume three pounds as the average weight of fleece throughout the Union.

"*Cost of keeping sheep through the year.*"—This question can only be answered with reference to each particular locality, and even then it depends upon a variety of circumstances; such as being near to, or remote from, a good hay market—having a good or bad year for grass, &c.

As a general rule, land that will ordinarily yield one ton of hay or 40 bushels of corn per acre, will support one hundred sheep to every thirty acres, summer and winter. Twenty acres will graze them, and ten acres will yield the hay and grain required. With that data it is easy to perceive that the cost of raising sheep and growing wool must vary immensely. Thus, upon the prairies of the West and South-west, where land is worth $1.25 per acre, the cost is a mere trifle; while in New York and New England, where land ranges from $25 to $60 per acre, it will, of course, cost much more. And yet there is scarcely a farm in the country where sheep cannot be profitably kept. Lands are generally valuable because of their proximity to markets; and while the carcass of the sheep is worth comparatively little in remote districts, yet near the large towns, and among a dense population, the mutton is worth as much as the wool—making it thus a profitable animal to raise even upon high-priced lands.

"*Where are your markets?*"—Our markets are purely domestic, as no wool is exported, nor can there be for a long time to come. The demand far exceeds the supply; and we import annually from 12 to 20 million lbs. of wool, besides nearly or quite as much more in a manufactured state. If our fine wools were as well washed and prepared for market as are the German wools, and as well assorted, in many seasons we might export wool to England; and much of the finer and medium grades grown upon the prairies would, if properly assorted, pay to export.

Of the wool consumed by manufacturers in ordinary years—that is, when there is a fair demand for fabrics—upwards of 28 millions of pounds are manufactured in New England, about 12 millions in New York, and about 10 millions in the other States, making about 50 millions of pounds the total annual consumption, aside from that manufactured by the producer at home. The machinery, however, now in operation is capable, in prosperous years, and when it is an object, of manufacturing upwards of 70,000,000 lbs.

"*The system of selling.*"—The common practice is for farmers to sell their clip at their own doors, to the agents of manufacturers or wool dealers in the large cities.

"*Are there any wool depots—and are they found advantageous to wool grower and manufacturer?*"—There is but one wool depot west of the Hudson river, and that is the one in this city, originated and carried on by myself; and every year's experience convinces me more and more that the system, if properly conducted, is the only one whereby the farmer can get the full market value of his wool, or the manufacturer obtain his supplies at a reasonable rate. The benefits and advantages are briefly stated in the following extract from a letter written by myself to a friend, and published in that very excellent work, "Sheep Husbandry in the South," published by J. S. Skinner, Philadelphia:

"I will give you, first, an account of the object; second, the method of doing business; and third, the advantages of the wool depot system.

"*The object.*—Upon no sheep is the wool exactly alike over the whole body; nor is the wool exactly alike upon any single flock. In most flocks there is a great diversity—greater than there should be for the farmer's profit. There is, then, a variety of grades of wool in every flock, and in every section of the country where wool is grown.

"Manufacturers first grade the wool; that is, sort the fleeces, making from five to eight or nine different grades. Each fleece is then opened and stapled, or sorted into the various grades in the factory. Some manufactories use only the finest, others only the coarsest, and others again use only one kind of the intermediate sorts, so that from a single flock I sold this year wool to five different manufacturers, no one wanting or working the kind the others wanted. Now the object of the wool depot is to sort and arrange the wool, that the manufacturer may readily obtain the particular kind adapted to his machinery, and to obtain for each sort its fair value.

"*Method of doing business.*—I have a competent and experienced sorter, and when wool is sent in it is at once sorted in the fleece, each sort weighed and entered in a book under the name of the person sending it. After the wool has been properly sorted, it is piled up in a manner that will enable the purchaser to see it to good advantage; insured, and held until the market requires it. I make all my sales here, and for cash. When the sales are closed, an account is made out and sent to those who have sent me their wool; usually an account is rendered as fast as any part of a man's wool is sold. I have often been asked how I could tell whether any man's wool is sold, unless the whole sort was sold at a time. It is very easy. Suppose A has 100 lbs. of No. 1, and I have sold 20,000 lbs. out of 40,000 lbs.—that being the whole amount in the depot—I have sold one half of each man's No. 1, and I turn to A's account and give him credit for 50 lbs. sold, and so go through, and credit each man with his proportion of the quantity sold.

"The charges for receiving, sorting, and selling, are one cent per lb. and the insurance—which is usually about 30 cents on $100, for three months. Cartage from the docks is about three cents per bale. The sacks are returned, or sold, at the option of the owner. They are usually worth about fifty cents, more or less, according to their condition. Each man's wool is carefully examined; if put up in bad order, it is so noted, and a deduction made by the sorter, to make it as it should be—so that it is no object for a man to send to the depot wool in a bad condition.

"*The advantages.*—The foregoing facts would seem to be so plain, that it cannot be necessary to refer to the advantages. No man, however, is more at the mercy of the speculator than the wool grower. The very fact that he has so many kinds of wool in his clip prevents him from ascertaining the market value of the whole: for being in comparatively small quantities, he has not enough of each, if ever so well sorted, to make it an object for the different manufacturers to visit him. He is therefore compelled to sell his whole clip at the price of his present quality, and at prices from five to fifteen cents per pound under the real market value of his wool.

"When the manufacturer can get the kind of wool he wants, and in large quantities, he is willing to pay, and does pay a better price, than when he has to buy that which he does not want, to get the right sort. It also equalizes the market, and brings the producer and manufacturer together without being compelled to pay agents or speculators, and prevents that fluctuation of the market which is always produced by speculation.

"But there is another great advantage growing out of this system. It enables the wool growers in various sections of the country to compare wool, and to know who has really the best and most profitable kind of sheep. It has been strikingly manifest to me this season: for I have been enabled to point out to people in different States west, where they could find the most profitable sheep, by the wool which had been sent me. And in one instance, men had been five hundred miles after sheep, and paid high prices, when there were sheep in their own town worth double the money.

"Nothing is more certain, than that a wool depot, to be successful, must be so located as to command a large amount of wool. The larger the amount you can concentrate at one point, the more rapid and sure will be your sales."

"*The number killed by dogs.*"—The laws are so stringent on the subject in the State of New York, that few sheep are annually lost from being killed by dogs. But in some States, particularly in Ohio, the destruction of sheep from being killed by dogs is a very serious evil, and prevents the increase of sheep to an important extent. It costs annually nearly or quite as much to keep a common-sized dog as it would to keep five good sheep. I apprehend, however, there is no comparison of the profits made upon the sheep and the dog. That community, which keeps dogs to the exclusion of sheep, is truly to be pitied; and it is to be hoped, that as the great value of sheep becomes more generally known, these communities will become very rare.

With much respect, I am very truly yours,

T. C. PETERS.

Hon. THOMAS EWBANK,
Commissioner of Patents.

SHEEP HUSBANDRY.—WOOL DEPOTS.

WASHINGTON, PENN'A., *Nov. 26th,* 1849.

SIR:—Your circular of July, 1849, came duly to hand, and I have concluded to answer, as far as is in my power, your inquiries in relation to "Sheep Husbandry," being more acquainted with this than any other subject upon which you have solicited information.

"*The prevailing race of sheep*" in western Pennsylvania is the Merino. In some regions the native sheep are still cultivated in small flocks. In eastern Pennsylvania the Bakewell, Cotswold, and other races are raised to some extent, but not in large flocks. Wool is the staple of this county, and is perhaps more extensively grown than in any other county in the Union. Here most of the flocks are crossed with the Saxon, and many of them possess the characteristics of that race. The business of wool-growing has attained a high degree of improvement, but still there is room for *progress* in this highly interesting branch of American industry.

"*The condition of this branch of industry*" with those who have their wool thoroughly cleansed is quite discouraging. Those who have their wool but partially cleansed have sold at about the same price obtained by those who have their wool *clean* and *light.* They of course have less reason to complain of prices. This is owing to the unrighteous system of buying wool, which is usually done by injudicious speculators and agents, who traverse the country from house to house, and most of them are unqualified, and too careless if they were, to discriminate either as to quality or condition.

The amount of wool clipped in this county annually is over a million of pounds.

"*The average weight of fleece of the different races*" of sheep depends very much upon the size and condition of the sheep, and also upon the compactness of fleece, length of staple, and condition of the wool. Hence, when I read of very extraordinary heavy fleeces, I conclude the flock is small, the sheep large and in high condition, the fleeces compact, staple long, and wool *not very clean.* So that the character of the flock, as regards texture of wool and weight of fleece, depends very much upon the care, judgment, and taste of the grower. Fleeces of Saxony sheep are generally light; one reason of which is, more attention has been paid to fineness of fleece than other requisites which constitute the *perfect* animal. As a general rule, however, medium and low grades produce much heavier fleeces than very fine sheep. Many flocks in this country, when the owners have pride and honesty sufficient to induce them to have their wool in a high state of preparation for market, do not average more than two pounds in the fleece. And if all the wool of the country were thoroughly cleansed, the average would not exceed that very much.

"*Cost of keeping sheep through the year per head,*"—about one dollar. This, however, depends in a great degree upon the size of the sheep. For like other animals, they require an amount of nutriment proportioned to their size.

Philadelphia was formerly our principal market; but recently most of our wool has been sent directly to New York and New England.

Our "*system of selling,*" as above stated, is to speculators and agents who traverse the country during the season, frequently calling at the same

house several times, buying up the wool without judgment or discrimination, either as to quality or condition.

We have no "*wool depots*," but I have no hesitation in saying that when adopted they will be found mutually beneficial for wool growers and manufacturers. To secure their establishment, it needs only that they should be understood. The failure of the depot at Springfield, Massachusetts, may operate temporarily against this system, but it should not. That failed because it was not founded upon the right basis, nor in the right location, and was imprudently conducted. Wool depots should be established by regularly organized companies of wool growers, in the region where the wool is grown.

We had it in contemplation last summer to establish a wool depot here. A meeting was held, and a committee, of which I was a member, was appointed for the purpose of establishing one. The committee prepared a constitution, but, after consultation, deemed it too late in the season for definite action. At first, the only difficulty presenting itself was the procuring of necessary funds for making partial advances on wool which might be deposited by those needing such advances. This difficulty was, however, subsequently supposed to be obviated by a proposition from an experienced Eastern financier for creating a permanent loan of $500,000, which appeared entirely practicable. A constitution was drafted, which contemplated a joint-stock company of wool growers, who, when organized, were to elect a board of directors to manage the concern. The directors were to procure an experienced wool-sorter to grade or class the wool.

This grader was to be sworn, as flour inspectors and other agents are, to discharge the duties of his station faithfully and impartially. The directors were also to borrow the necessary funds, and be responsible for reimbursement, and to hold the wool deposited in the depot as indemnity for their liability; and the depot and wool deposited were to be insured, so that there could be no risk either on the part of borrowers, lenders, or depositors of wool. It was also made the duty of the directors to appoint a corresponding secretary to correspond with various parts of the world, for the purpose of ascertaining the state of the wool-trade, and report to the directors, from time to time, the result of his inquiries.

Thus the directors would be enabled to fix their prices intelligently on the various grades of wool in the depot.

The benefits which would result from the depot system, both to wool growers and manufacturers, are numerous, some of which I may be permitted to notice. First, I remark that the wool embraces such a variety, both as to quality and condition, which renders it impossible for common observers to make a proper discrimination, so as to enable them to judge its real value. This could be done by an experienced grader, who could enable each individual depositing to receive an equitable price, according to its real worth. By a just discrimination, this grader would make it the *interest* of all to have their wool thoroughly cleansed, a consummation greatly to be desired by manufacturers. This season the wool of this county will cost the manufacturers $60,000 more than the wool growers obtain for it. By the depot system, three-fourths of this enormous sum, say $45,000, could be saved, to be divided between growers and manufacturers. By the depot system, the immense amount of time consumed by speculators and agents, would all be saved; and more than that, the wool growers would be relieved from the vexatious stories about the dreadfully depressed condition of

the wool market. By the depot system, the wool will all be completely cleansed and judiciously graded, and the manufacturer will have no difficulty in choosing the kind of wool he wants, which being *clean*, he will have no difficulty in determining its value.

These and many other beneficial results are to flow from the depot system, and I confidently hope that the period is not remote when this system for disposing of wool will be adopted.

I should have been pleased to give you a more definite account of the *amount* of wool grown in this State, but not having the statistics, it is out of my power.

Yours, very respectfully,

SAMUEL McFARLAND.

Hon. Thos. Ewbank,

Commissioner of Patents.

ROOT CROPS.

"Irish and sweet potato, turnips, carrots, beets, mangold wurtzel, artichoke, and other varieties—comparative value—cost of production—weight per bushel—and the average per acre, and aggregate product for your State." [Circular.

The communications here given, in reply to the above, do not contain as full information on this subject as we could wish to lay before our readers; but they will show, in some measure, the extent of root culture, and the success or failure of the potato crop in different parts of the country.

In Maine, as appears from the report of George W. Drisko, of Washington Co., there is an increase of 33 per cent. over the crop of 1848. Many fields entirely escaped the rot; while others were more or less affected. "Our farmers," says he, "seem a good deal encouraged, and will probably, next year, plant after the old style, and to as great an extent as before the disease appeared. Planting and digging early have been found the only effectual preventive against the disease in years past. The average produce of potatoes per acre for the last two years will not exceed 175 bushels; price from 50 to 75 cents. Little attention is paid to the culture of other root crops, except in the garden for family use. Turnips have been grown to some extent, and are highly valued as food for sheep and cows."

In New Hampshire, different correspondents seem to agree in reporting the ravages of the potato disease as gradually decreasing. Mr. Marsh, of Sullivan Co., says: "The crop this year has suffered somewhat, but the disease has been more local, and would seem to justify the hope that it will eventually disappear. I have cultivated this vegetable extensively for the last three years, and have succeeded in growing healthy crops. I think we may safely depend upon a profitable crop by making use of dry swamp muck, together with potash, soda, lime, magnesia, and sulphuric acid; as these are the inorganic elements required by the plant to form healthy tubers."—Mr. Huntoon, of Unity, says: "On old pasture land, without manure, they are found not to rot. The average produce on such land is about 100 bushels per acre; number of bushels annually raised in the State before the rot commenced, about 7,000,000. Since that time it has not exceeded 4,000,000."—Mr. S. Hale writes us from Keene: "The only root crops raised here for other than family use, are potatoes, carrots, turnips, and beets—the last two by a few farmers only. Many years ago, it is said, that 600 bushels of potatoes were raised from one acre in this town; but now the average yield varies from 100 to 300 bushels. I think them a very exhausting crop. Of carrots the quantity raised in this county is constantly increasing; the product being from 500 to 900 bushels per acre. I raised this year, 85 bushels from one-eighth of an acre. A neighbor of mine raised 225 bushels from one-fourth of an acre; value from 20 to 30 cents per bushel."

Mr. Samuel Wells writes from Northampton, Mass., as follows: "The produce of potatoes has been very large this year, and mostly free from rot. In this section they are extensively grown as a field and garden crop, and fed in large quantities to stock during the winter. Turnips are raised to some extent for sheep, and beets and carrots for cattle and horses. Roots

are getting more into use for feeding to stock, and many barn cellars are now being constructed for storing them. Average yield of potatoes, 200 bushels; turnips, 500 bushels; beets 500, and carrots 300 bushels per acre."

From Hydepark, Vermont, Mr. Thurston writes, that potatoes have not rotted the present year. He says: "They can be raised here for 12½ cents per bushel, and sell readily in our factory villages for 20 cents. Swede turnips are raised to some extent as food for stock."

Mr. John G. Clarke, of South Kingston, R. I., gives us the following information on this subject: "Potatoes have been, until lately, largely cultivated in this section, but the rot has prevailed so extensively that this year not more than one-fourth as many acres were planted as were five or six years ago. The disease has been most destructive near the sea, and the shores of Narragansett bay, where the greatest quantity was formerly raised. Many farmers there raised from two to three thousand bushels. The kinds mostly cultivated are the Mercer or Chenango, White and long Red. The Mercer is much esteemed, and sells at a higher price than any other kind. Two hundred bushels per acre is about the average crop. Carrots are largely cultivated. The method practised by those who grow them extensively, is to plant carrots and onions in alternate rows, the onions ripening and being removed before the carrots require much space. It is said that as many carrots can be raised in this way as if planted alone. This method is well worth the attention of farmers, as it is confidently recommended by persons of experience."

In Delaware Co., N. Y., as we learn from Mr. Merreck, the ruta-baga, Norfolk turnip, and wurtzel are successfully raised for cattle. But the demand for hand labor in their cultivation so far exceeds that of any other crop as to prevent their being extensively grown where land is so cheap and labor so dear. "Of potatoes, the red or hemlock and the English white yield well, are of good quality, and have most successfully resisted the rot, of late the common enemy, which has discouraged their cultivation except for table use."

Mr. Thomas writes from Wayne Co., N. Y., as follows: "With the exception of the potato, root crops are but sparingly cultivated. A few intelligent farmers, however, find great advantage in raising ruta-bagas, carrots, and beets; the carrots are much the best. The average yield of potatoes has diminished of late years, independently of the rot, from unknown causes, and rarely exceeds 100 bushels per acre. They are more easily raised than ruta-bagas or carrots, the latter needing much more hoeing. But the amount of labor required may be much lessened by ploughing and cultivating the ground repeatedly, from early spring until seeding time, which clears the soil of weeds."

Mr. Adams, of East Bloomfield, N. Y., says: "Since the potato rot has prevailed, the culture of this crop has very much declined. They are now of too much value to feed to stock, or to use for distilling. Carrots are the most popular roots cultivated here, and are in a great measure superseding ruta-bagas, wurtzels, and sugar beets. They are raised mostly for cattle and horses. No better food can be procured for milch cows. Horses are very fond of them, and they are considered very healthy. The cost of raising carrots depends very much upon the former culture of the land, whether clean, or full of foul seed. The best way to cultivate this crop is in drills 3 feet apart, and with the plants 6 inches asunder in the rows. After the first weeding the cultivator is used. When large crops are raised

the expense varies from \$50 to \$100 per acre, and the yield from 800 to 1300 bushels. They are worth at least 12½ cents per bushel to feed to stock."

Mr. George Blight, of Germantown, Pa., prefers ruta-bagas to carrots, beets, or any other root crop. He says: "I consider ruta-bagas the most valuable crop, from their requiring less labor; they can be planted as late as 15th July, the others only in spring. And besides, carrots need the most care during the wheat harvest, and are therefore a more expensive crop. Cost of raising an acre of carrots, about \$50; of turnips, about \$20. Ruta-bagas may be grown after oats."

From Granville, Ill., Mr. Ralph Ware writes as follows: "Root crops are but little cultivated, except potatoes. These yield on an average 200 bushels per acre, and the cost of production is about 6 cents per bushel. They have not suffered from the rot here, except in 1848, and a little in 1849."

In Floyd Co., Ind., as we learn from Mr. Wm. Russell, the Irish potato is a very profitable crop. It produces well, and has not been materially affected by the disease. Cost of cultivating, about the same as Indian corn, and the average product from 150 to 200 bushels per acre.

In Wisconsin, according to the report of Mr. Perkins, of Burlington, the crop of potatoes the last season was light, although sufficient were generally raised for table use. They were less affected by the rot than for several years previous. Other roots suited to the climate yield abundantly, but require so much labor that they cannot compete with the coarse grains for feed.

Mr. Benj'n Whitfield, of Tuscaloosa, Ala., writes thus: "The yam is the only root crop raised in this section of the country to any extent. It succeeds best on land rather sandy, and not too rich; such ground as would produce 20 to 30 bushels of corn to the acre. Yield from 200 to 300 bushels per acre. I have tried all the root crops for cattle, and think the yam superior to any other for that purpose. They are good food for milch cows, producing a large quantity of rich milk. They should be fed early, as they are somewhat difficult to keep."

Dr. White, of Quincy, Fla., says: "The Irish and sweet potato both do well in this climate. Average of the latter, 200 bushels per acre. Turnips and ruta-bagas also succeed well here, and yield abundant crops."

Mr. Wm. S. Keaghey writes from Jasper Co., Texas, as follows: "But few Irish potatoes were planted last spring, from the difficulty of obtaining seed. They were sold then for \$2.00 per bushel. What few were planted did well, and yielded a large return. Sweet potatoes are raised here equal in quality to those grown in any of the Southern States. Of all the varieties tried, the yams and red Bermudas were the best."

POTATOES.

Potato leaves contain 79 per cent. of water, and nearly 13 per cent. of ash, calculated dry. The stems contain 78 per cent. of water, and about 8 per cent. ash. Estimating the ash before the stems and leaves are dried, the latter has 2.63 per cent. and the former 1.735. In the tubers there is a little over 75 per cent. water, and 2½ per cent. ash, dry weight. In 100 parts of the latter, Prof. Emmons found

Silica	1.850
Earthy phosphates	21.100
Carbonate of lime	0.600
Magnesia	0.500
Potash	48.365
Soda	5.025
Chlorine	4.090
Sulphuric acid	1.200
Organic matter	2.456
Carbonic acid	15.725
	99.911

Omitting the carbonic acid and organic matter in the above table, as of little practical importance, it will be seen that the proportion of potash exceeds 50 per cent. This is an important fact, and indicates the value of ashes as a fertilizer for this crop. Mr. Salisbury found 20 per cent. of starch in one specimen of sweet potatoes, and less than 70 per cent. of water. It also gave nearly 7 per cent. of albumen and casein; and over 3 per cent. ash calculated on the dry matter.

The Southern Cultivator contains a statement of Mr. Aaron Adkins, who raised 307 bushels of sweet potatoes on an acre, at an expense of $10, or a little over three cents a bushel. The potatoes were cut and dropped into deep furrows, (on dry mellow land,) in rows three and a half feet apart, and covered with a plough. They were not hoed, but cultivated with the shovel-plough—throwing the vines over to one side for a furrow near the hills, and then replacing them and clearing the opposite side to plough that also. A small plough was run nearest the plants, and a larger one in the centre of the rows. The crop was lifted out of the ground with the plough, so that no hoe went into the field. For feeding cows while giving milk, ewes and lambs, sweet potatoes are fully equal to Irish, if not superior. It is a crop the culture of which ought to be extended wherever the climate favors its production. Professor Emmons gives the following analysis of the ash of the leaves and stems of this plant:

Silica	23.600
Earthy phosphates	28.575
Carbonate of lime	15.000
Magnesia	none
Potash	18.515
Soda	9.460
Sulphuric acid	2.785
Chlorine	2.090
	100.025

There have been sent to the Patent Office several papers of considerable length on the potato disease, which are left out of this Report, because they furnish no new information on the subject. Dr. Richardson, of Baltimore, has made what he seems to regard as a great discovery, in reference to the ravages of an insect which deposits its eggs in the stems of growing potatoes, usually in June in that latitude, which hatching furnish larvæ that eat their way downward, and finally escape near the ground. The writer has been familiar with the attacks of this depredator for the last five years,

and was the first to describe and figure its larvæ. Several other gentlemen besides Dr. R. refer to this insect as the cause of the potato rot; and it destroys many thousands of bushels every year. It is not, however, the only cause of this malady. To satisfy these gentlemen that the priority of discovery is not with them, a paragraph is copied from the Patent Office Report of 1845, page 489:

"The editor of the Genessee Farmer, Dr. Lee, has made an extensive examination of the potato crop throughout central New York, and finds in *all cases* the curling and blight of the vines are attended by an insect. The parent is probably a beetle. It punctures the vine just above the ground, and deposits its egg in the pith of the stalk, where it hatches. The larvæ eat out all the stalk but the outer bark, when the stem withers and dies. Dr. Lee thinks that this prevents the ripening of the tubes and disposes them to decay. The blight, it is found, will be more severe this year than last." During the two seasons last past the writer has seen this insect and its destructive works in Georgia and South Carolina; but he is sorry to say that he has no remedy to suggest.

In regard to the cultivation of potatoes, a few remarks are deemed appropriate, founded alike on experience and scientific research. There is no closer observer of natural phenomena in western New York than Mr. John J. Thomas, who says: "The average yield of potatoes has diminished of late years, independently of the rot, from *unknown* causes, and rarely exceeds 100 bushels per acre." Evidence to this effect might be cited to almost any length. The fact is known to thousands; the cause to but few. For ten years the writer has believed and said on all proper occasions, that the robbing of the soil of its potash and other elements indispensable to the healthy organization of potatoes, has tended powerfully both to diminish the crop, and impair the constitutional vigor of the plant. A writer in the Patent Office Report for 1845, (in which the potato malady alone fills some 200 pages,) over the signature of "Chemico," says: "Dr. Lee, a scientific gentleman of New York, who is at present engaged by the New York State Agricultural Society to visit every county in that State and deliver lectures on agricultural chemistry, in a letter to the editor of the Albany Cultivator, remarks: 'More than one-half of the ashes of potatoes is pure *potash.*' A sugar maple, a grape vine, a potato plant, and an apple tree, need a soil that *abounds in potash.* In every town I have found scientific farmers, who, by the use of *unleached ashes*, *lime*, and *plaster*, in equal parts, and placed in the hill with the seed, and on the hill as soon as the tops are well grown, have wholly escaped the potato rot, and harvested for several years from 500 to 600 bushels per acre." Having found from personal experience that this treatment, even on good sod loam, and on new ground with an abundance of rotting forest leaves, was highly beneficial, we had before recommended it.

In organizing the elements of water and carbon into starch, sugar, and woody fibre, the writer became satisfied, fifteen years ago, that the presence of an alkali or alkaline salt was indispensable. His researches were commenced for the purpose of determining, by careful weighing, what elements and how much of each were consumed in forming 100 lbs. of sound potato plants, including all that grows below and above ground. Few farmers or men of science have any definite idea how much of the substance of the earth, whether organic or inorganic, is dissolved and taken up by the roots of a crop of corn, wheat, potatoes, or in the growth of an apple orchard,

including its fruit and leaves, in the course of a season or year. It is to be regretted that the American people will not, either through Congress or State Legislatures, encourage investigations into the growth of all cultivated plants and domestic animals. If it were customary for officers in the army and navy, and others, to work for nothing and find themselves, perhaps agricultural chemists and entomologists might do the same. The misfortune is, that science, as applicable to rural affairs, is not appreciated by legislators and the public at large. Hence every dollar expended for the promotion of agriculture is so grudgingly bestowed, that gentlemen of talent and science turn their attention to military and other pursuits, which pay far better, both in honor and money.

The March number of the American Farmer, for 1850, has the following paragraphs on the culture of potatoes:

"As to the yield of potatoes, that is a thing which depends upon many circumstances, as the preparation of the soil, its character, its appropriateness, and quantity of the manure applied, the kind of potato, the culture, and upon the season as much as any thing else. In former years, the average crop was rated at 400 bushels; at a later period, 200 bushels per acre; at a still later, 150 bushels; and since the appearance of the rot, no calculation could be safely made of average products, and he who made 100 bushels to the acre felt that he had raised a good crop; few growers reached that point, while many did not save from the effects of that vegetable pestilence, more than from 30 to 60 bushels, and in numerous instances the whole or nearly the whole crop rotted in the ground. But as the disease has wellnigh abated, the farmer has a right to hope for more fruitful yields; and under a favorable concurrence of circumstances, in auspicious seasons, in good soils, well manured, well prepared, and as well cultivated, we do not see why from 300 to 400 bushels to the acre may not be calculated upon. We do know that the latter quantity has been raised upon that quantity of ground, and as what has been done can be done again, no farmer should despair of its accomplishment; but, on the contrary, set himself to work with the firm determination to raise that number of bushels on an acre."

On new land, rich in organic matter and rich in alkalies and alkaline earths, 400 bushels were a common yield. Then 200 became a good harvest; followed by 150, and down 60 and 30 bushels per acre.

Gen. Barnum, of Vermont, many years ago, raised 1000 bushels to the acre; but his process of culture involves so much toil and hand labor, that we doubt the economy of growing them after his plan. His mode was this:

He ploughed, harrowed, and rolled the ground, so as to bring it into a state of perfect tilth, having previously prepared a rich, light compost for the purpose of manuring and raising the rows as the plants should require it. In planting the sets on the surface, he had them covered two or three inches deep with the prepared compost. When the plants came up and had grown to the size of 4 inches in height, he caused his men to go through the patch, and place alongside of the rows a sufficient quantity of the compost to form a slight hilling; at the second and third workings, the hillings were increased and completed in a similar way, the compost thus smothering the weeds immediately near the plants, while the rest were removed by the hand. The middle of the rows were, during the season, kept clean by running the cultivator through them.

Composition of the Ash of Potatoes.

	Tubers.	Haulm.
Carbonic acid	13.4	11.0
Phosphoric acid	11.3	10.8
Sulphuric acid	7.1	2.2
Chlorine	2.7	1.6
Lime	1.8	2.3
Magnesia	5.4	1.8
Potash	51.5	44.5
Soda	trace	trace.
Silica	5.6	13.0
Oxide of iron	0.5	5.2
Charcoal and loss	0.7	7.6
	100.0	100.0

The above analyses were made by M. Boussingault, one of the most reliable chemists in France. If we deduct the carbonic acid, the proportion of *potash* in the ash of potatoes exceed 56 per cent. If we deduct charcoal, loss, and carbonic acid from the haulm or tops, the potash in this part of the plant exceeds 50 per cent. The inference is plain: a soil should be rich in such elements as the crop needs, one of which is potash.

As a general thing, decomposing turf, rotting forest leaves, ashes, and fresh lands, abound in all the constituents of potatoes. On the other hand, old and long tilled fields, without sod, with little mould, and less alkaline salts, yield small harvests, and in the course of a few generations so impair the vital force of this family of plants, so badly treated, that premature "rot" is reasonably to be expected. Insects hasten the work of disorganization. The *fungi*, which grow so luxuriantly on diseased tubers, are to be regarded less as *causes* than *effects* of the constitutional malady. There is an essential difference in potatoes in their ability to withstand the purely chemical forces which tend to fermentation and putrefaction. It is believed by many, that all vegetables propagated by buds instead of seeds, like the best varieties of fruit trees, sugar cane, and the tubers of the potato plant, are less able to endure any prolonged defect in their food, or in climate, than seedling plants. This department of vegetable physiology eminently deserves further investigation. The art of feeding cultivated plants is in the *embryo*—not born. Rural art, based on science, *is yet to be learned.*

CULTURE OF ROOT CROPS.—By Wm. Perry Fogg.

The real value and importance of the culture of roots as food for stock is but little understood by American farmers. It is only within a few years, since the ravages of the potato disease have directed public attention towards finding a substitute for this valuable esculent, that the field culture of carrots, beets, turnips, and ruta-bagas, has attracted much notice in this country. The value of these roots for keeping stock through the winter, and for fattening cattle, is now beginning to be appreciated by our farmers; and a few remarks on the mode of culture and land adapted to each, as well as their relative value compared with potatoes, for which they are often substituted, may be interesting and profitable.

Turnips and ruta-bagas.—In England and Scotland turnip culture, or "green cropping," forms a very important feature in the system of farming. In no other country is the culture of turnips so thoroughly studied and so well understood. As fertilizers for this crop, they use lime, guano, and bone-dust; and the yield per acre ranges from 1000 to 1500 bushels. For all root crops a deep, well-drained soil is necessary, which should be completely pulverized and rendered mellow by the frequent use of the plough and harrow. Turnips may be grown to advantage on a heavier soil than is adapted to carrots or parsneps. Of the common varieties, the *white Norfolk* succeeds best on low lands, and the *Globe*, or *green-top*, on high and dry soils. To insure a large crop, they should be sown in drills from 16 to 20 inches apart. Turnips have an advantage over all other roots, that they can be sown so late, on ground where other crops have failed. In England large quantities are grown with early peas, being drilled in between the rows before the pea-vines are removed. For no kind of stock are turnips more valuable than for sheep. The unpleasant flavor they impart to butter is a serious objection to feeding them to milch cows. The cost of culture depends upon the price of labor, &c., and of course will vary in different sections of the country. The following statement of Mr. Geo. W. Wood, of Middleborough, Mass., as to the cost and product of ½ an acre of turnips, is about a fair estimate for New England: *

Soil, clayey loam; sown in drills 18 inches apart.

Expense of ploughing 75 cents, harrowing 50 cents	$1.25
Ploughing and harrowing $1.00, 5 days' work planting, $5.00	6.00
100 bushels of ashes $12.10, carting the same $3.00	15.10
Cultivating, hoeing, and weeding	5.50
6 days' work harvesting $6.00, seed 50 cents	6.50
Total	$34.35

Product, 435½ bushels; cost per bushel, about 8 cents.

Mangel-wurtzel and sugar-beet.—The culture necessary for the beet is essentially the same as that required by the turnip. The land should be ploughed deep, using if practicable the sub-soil plough, and well manured. Common salt has been used as a fertilizer on land where wurtzels were to be grown, and the effect was to very much increase the crop. This is readily accounted for, when we compare the analyses of the bulbs and tops of the mangel-wurtzel, turnip, and carrot, made by Prof. Way.—(*See Jour. Royal Agric. Soc.*) One ton of each of these yielded of *common salt* the following proportions:

	Roots.	Tops.
Mangel-wurtzels	5.29	12.82
Carrots	1.42	11.25
Turnips	1.49	6.15

In one instance the application of three cwt. of salt to an acre, not with the intention of benefiting the crop, but to destroy the grub-worm, resulted in an increase of the yield from twenty-six to forty tons,† thus showing the necessity of supplying to plants those mineral elements essential to their growth, and which exist in the soil in minute proportions.

* Transactions of Plymouth Co. Agricultural Society.

† Quarterly Journal of Agriculture, Edinburgh, No. 27, p. 177.

As the seed of the beet is inclosed in a large rough shell, it should be steeped for at least 48 hours before sowing. This is especially necessary when the ground is dry; otherwise the seed will lie a considerable time before sprouting, if it grows at all. The rows should be from 24 to 30 inches apart, so as to leave sufficient room for a horse-hoe or small plough to pass between. About 4 lbs. of seed are required to the acre. Beets are more exhausting to the land than turnips or carrots, and do not leave the ground in as good condition for the succeeding crop. They contain more nutritive matter than turnips, and as food for milch cows, and for fattening cattle and hogs, they are very valuable. The skillful fattener of stock always feeds cut hay, straw, bran, or some other dry food, along with wurtzels, turnips, and carrots, as the former contain a considerable per centage of oily matter, which contributes towards fattening the animal, and they also counteract the loosening tendency of the roots. When fed to hogs, they should be cut fine, steamed, or boiled, and mixed with a little corn-meal or bran. In this way they will go nearly as far as the same weight of potatoes. Even supposing the nutritive power of these roots but two-thirds that of potatoes, when we take into account the difference in the average yield per acre, the balance is decidedly in favor of the roots.

Carrots and Parsneps.—Of all the root crops, carrots are decidedly the most popular in this country for field culture, and they certainly possess some advantages over all others. They are easily raised, and on suitable land yield abundantly. They grow well on light soil, where neither beets nor turnips would succeed, and, if properly managed, require no more labor in their cultivation than other roots. Almost all domestic animals eat them with avidity, and horses especially are extremely fond of them. When not very hard worked, they thrive well if fed wholly or in part on this root, and they can thus be kept through the winter at one-half the expense of feeding oats. As a winter food for milch cows, both carrots and parsneps are unsurpassed for the quantity as well as quality of the milk and butter produced. Indeed, carrots are more generally valuable than any other root, except the potato; and for feeding to stock, are the best substitute for this which has yet been tried.

In France, where the carrot and sugar-beet are extensively grown, the land is usually ploughed twice in the fall, and about half the manure then applied which is intended for the whole crop. It remains in this condition until spring; and then, as early as the weather will permit, it is again ploughed, after spreading on the remaining half of the manure. It is then levelled off and frequently harrowed until the soil is rendered light and friable. For carrots and parsneps the soil should always be deep, with a sub-soil through which the root can easily penetrate. As they run deep into the ground, they derive most of their nourishment from below, and do not much exhaust the organic and mineral elements in the surface soil. The seed should be sown in drills at about the same distance as turnips. The plan adopted by some is to make the rows alternately 12 and 24 inches apart, so that they can run through every second row a horse cultivator or corn-plough—and this method is found to save much labor in their cultivation. The suggestion of Mr. Clarke, of So. Kingston, R. I., in the preceding extracts on Root Culture, (page 260,) viz: to sow carrots and onions in alternate rows, is well worthy of consideration. For sowing carrots or any other seeds of this kind, a seed-drill should be procured if possible. The labor and expense saved in sowing a single acre would nearly pay the

cost of the drill. The next important point is to keep them free from weeds; and this is the part of their culture most dreaded by the farmer. Indeed, the fear that weeding them out will constitute too severe a tax upon their time and labor, deters many from cultivating extensively this, or any other root crop. The seed should not be sown until late in the spring, when the ground has become sufficiently warm to cause it to grow at once. They will thus get the start, and keep ahead of the weeds, and require less care. The first time they are weeded out, let them be thinned so as to stand three or four inches apart in the rows. One thorough weeding is usually sufficient, except on very foul land, which should never be cultivated in this crop. Afterwards an occasional use of the horse-hoe or cultivator is all that is necessary.

They should be allowed to remain in the ground late in the fall, as they become in some measure hardened to the cold, and keep better than if harvested early. They can either be piled up in the field and covered with straw and then with a thin coating of earth, or stored away in the cellar for winter use. The parsnep does not require to be taken up and stored in winter. But when the frost is coming out of the ground in spring, at a time "between hay and grass," when all kinds of fodder are getting scarce, they can be ploughed out and fed to stock, and will then be found exceedingly valuable.

Analysis of the Ash of Roots.—It is important that the farmer should know what mineral elements are contained in the grain, hay, roots, or other products of his soil; and how much of these minerals he removes from his land in every hundred pounds of these crops. For unless there exists in the soil an *unlimited supply*, (which analysis shows to be impossible,) it must, after successive cropping, become exhausted in the essential elements of plants, and cease to be productive. In England, where this subject has been closely studied, it is now considered the leading idea of scientific farming, to supply, in guano, bone-dust, or special manures, the same mineral elements in as nearly as possible the same proportions in which they are required to form the given crop.

The following table shows how many pounds of each of these minerals are contained in *one ton* of the bulbs, and of the tops of turnips, beets, and carrots—being the average of several analyses of these roots made by Prof. Way:—

	In one ton of the Bulbs.			In one ton of the Tops.		
	Turnip.	Beet.	Carrot.	Turnip.	Beet.	Carrot.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Silica, (flint)	.84	.54	.24	1.73	.76	4.46
Phosphoric acid	1.77	.66	1.78	2.60	1.94	1.64
Sulphuric acid	2.33	.65	1.31	3.46	2.20	5.61
Lime	1.76	.41	1.77	11.29	3.31	30.24
Magnesia	.47	.43	.80	1.16	3.27	2.58
Peroxide of iron	.07	.12	.22	.72	.52	2.36
Potash	6.07	4.99	6.59	6.08	7.86	6.64
Soda	1.46	3.02	2.71	1.12	2.52	9.67
Chloride of sodium, (common salt)	1.49	5.29	1.42	6.15	12.82	11.95
Chloride of potassium	....	....	....	2.02	....	....
	15.76	16.11	16.79	36.33	35.20	75.15

Comparative Value as Food.—Without giving a full analysis of the organic part of these several roots, their relative value as food of animals can be judged with some degree of accuracy from the statement given below of the amount of water and of solid food contained in 100 pounds of potatoes, turnips, beets, and carrots.

	Potatoes.	Sugar Beets.	Mangel Wurtzel.	Carrots.	White Turnips.	Ruta-Bagas.
Water...........	75 lbs.	85 lbs.	85 lbs.	86 lbs.	90 lbs.	88 lbs.
Solid Matter......	25	15	15	14	10	12
	100	100	100	100	100	100

The above estimates are about the average, although the proportion is found to vary slightly in different samples of the same root.

RAISING POTATOES FROM THE SEED.

We have availed ourselves of the substance of a Report made by the Hon. Charles E. Clarke, to the Jefferson Co. (N. Y.) Agricultural Society, in the fall of 1849. On the subject of the decay of trees, bulbs, tubers, and roots, Mr. Clarke says: "It is a principle that plants, which are usually propagated from the bulb, root, or tuber, lose after a time their procreative or vivifying power, and it is necessary to resort to the original element or seed. The *hop* would lose much of its strength and productiveness, except for the introduction of an occasional male plant. The *dahlia* requires to be renewed, and it is impossible to preserve for any great length of time any particular species of apple or pear by continued engrafting. The bulb, the tuber, and the tree all grow old, and require to be renewed from the seed. This principle is strikingly illustrated in the case of the Lombardy poplar, now in a state of decay all over the United States. This tree, from the luxuriance of its growth, the symmetry of its proportions, and the beauty of its foliage was an universal favorite, and gained the name of the 'tree of civilization.' It was brought to America by the late Chancellor Livingston, about forty-five years ago, and has been propagated from cuttings alone. The female tree only was introduced, and it now bids fair to become extinct.

"Without inquiring whether the rot which has so extensively prevailed in the potato crop is owing to the fact that it is cultivated from the tuber, and not from the seed, it is true that certain varieties of the potato *do* resist the disease more than others. It is desirable to ascertain whether new varieties raised from the seed are less liable to be attacked by the disease than old, and experiments should be extensively tried, and the results carefully noted.

"It becomes therefore desirable to know the best mode of propagating the potato from the seed. For this purpose, select good, fair-sized, ripe potato balls, from the best varieties of potatoes, cut the balls open, and wash the pulp containing the seed in water, until the seeds are entirely separated from the pulp and perfectly clean, then strain them out of the water and dry them; examined with a microscope, they have the appearance of the seeds of the summer squash. The seed should be started in a hot-bed, so that the plants will be about three inches high when the weather

is so warm that there is no danger from frost. They should then be carefully transplanted into warm, rich, and mellow earth, and set in drills 2½ feet apart, and 10 inches from each other in the drill. The vines of potatoes thus set by me in 1849 grew strong and thrifty, 3 feet in height, blossomed, and bore balls, from which I have now the seed. Many of the potatoes attained a fair size, weighing in many instances six ounces each, and were good edible potatoes. In one season I have thus obtained over one hundred varieties."

Mr. Clarke adds: "That for two successive years the potatoes raised from the seed have been in no wise affected by the rot, and if there was not a potato in America, I should not despair of having a tolerable supply of good edible potatoes the first year from the seed. The common impression that three years are necessary to propagate potatoes from the seed is erroneous, and I impute the rapid growth and large size in the instance alluded to, to the perfect mode of saving the seed, and to high and judicious cultivation.

"It is an historical fact not generally known, that in the year 1742, there was in Ireland a disease similar to that which has prevailed of late years; and that the potato crop was cut off, and great distress, famine, and pestilence followed."

By the kindness of B. P. Johnson Esq., secretary of the N. Y. State Agricultural Society, we have received proofsheets of the volume of Transactions of said Society now going through the press, from which we condense the following: Mr. Aaron Killam, of Mexico, N. Y., has had great success in growing tubers from the seeds in potato balls. Tubers produced from seeds gave 175 lbs. of excellent potatoes to the square rod, and 230 bushels on a half acre; although an early frost killed the tops before the plants had ceased to grow. Mr. K. says: "I ploughed the land six inches deep, planted the potatoes three inches deep, leaving the hills level with the earth; and I planted the rows three feet apart, with the hills two feet from centre to centre, making 44 hills to the square rod, and 7841 to the acre. Allowing 14 hills to the bushel, as some of mine yielded, gives 500 bushels to the acre. *I fully believe, that if I had had seed from the balls sufficient to plant an acre, and cultivated them as I did what I planted, they would have produced at least* 500 *bushels.*" We take this occasion to repeat, what we have said elsewhere in connection with an analysis of potatoes, that *wood ashes*, in addition to a rich mould, are exceedingly valuable as a fertilizer for this crop.

ORCHARDS, FRUITS, &c.

"*Orchards, Fruits, Transplanting of Trees, &c.: also Cultivation of the Vine.*—Information on these and kindred subjects, will be of universal interest." [*Circular.*

In another place will be found several valuable communications on the above subjects, which will be read with interest by the orchardist and fruit grower. We here give a few practical hints on the transplanting of trees, &c., derived from the experience of those in various parts of the country who are striving to improve and extend this very important branch of rural industry.

Mr. R. A. Merriam, of Topsfield, Essex Co., Mass., writes as follows: "I have paid considerable attention to the transplanting of apple and pear trees. Both require well cultivated ground; and for the latter the land can hardly be made too rich. I have succeeded to my entire satisfaction in an experiment with wild pear trees taken from the forest. I have tried them of all sizes, from 3 to 30 feet high, cutting off the tops, transplanting and grafting them at the same time. The scions will grow from one to two feet the first year. Apple trees I prefer to take from the nursery, in the same or a more northern latitude. After being transplanted once or twice, as they usually are in the nursery, they have a much large rquantity of fibrous roots than those that have never been transplanted. The latter often have long tap-roots, which, in trees two or three years old, I have sometimes found to run 4 or 5 feet into the ground. I last year transplanted 200 young trees, 20 or 25 feet apart, covering two acres of ground. I dug the holes 4 or 5 feet square and 1½ feet deep. I mixed with the earth around each tree about a bushel of meadow-muck, well rotted; and thus far I am very well satisfied with their progress."

Mr. J. J. Thomas, of Macedon, Wayne Co., N. Y., who stands deservedly high as a skillful fruit grower, as well as a scientific and practical farmer, writes us as follows: "There has been shown for the past few years an astonishing increase of interest in the planting of fruit trees, in this section of the State. This is an excellent *apple* region. Peaches fail about one year in five. The trees live 20 to 30 years, but do not bear well when old, from a general neglect of the *shortening* in pruning. Pears suffer much from *fire-blight*, especially on very rich ground. The *Virgalieu* or *White Doyenné* is the most profitable variety; the product of single trees often bringing $20 to $30 per annum, to be sent to New York city. Plums do best on clay soils; cherries, quinces, hardy grapes, and strawberries, all succeed well. Raspberries are rather uncertain on light soil. Apricots succeed well if protected from the curculio.

"Enormous crops of apples are yearly sent East by the Erie Canal. The present season was the most unfavorable one for a series of years—not one-fourth of a crop—price of apples this year 50 cents per bushel. At 25 cents per bushel, the usual price, I have known orchards in favorable seasons to yield $100 per acre, for a single crop. The *Rhode Island greening* is the most celebrated and productive market variety. Single trees of this sort I have known, in several instances, to yield 40 bushels.

"In transplanting young trees, great loss is usually sustained by neglected after-culture, or by grass or grain crops among them—clean, mellow, and

enriching cultivation would bring them into bearing in *one-third* the time usually required."

Mr. L. Smith, of Sullivan Co., N. Y., says: "I have for the last ten years practiced grafting some of the best varieties of plums on wild-plum stalks, with good success. They grow very thrifty, retaining all the fine flavor of the parent tree, and are entirely free from those diseases to which the plum is subject."

Mr. R. C. Holmes writes from Cape May C. H., N. J., as follows: "Apples, pears, and peaches of all kinds flourish well in this section. We have here a kind of pear, known as the *Cape May pear*; which I have never seen in any other part of the country. It is as large and as yellow as an orange. Keeps all winter, and is as juicy as the *Catherine* or *butter pear*. It bears well, and I think it is preferable to any of the French pears now being introduced. It is hardy, and equal to the quince for preserving. I have pear trees on my farm nearly 100 years old, loaded with fruit, which this year is small from the large quantity."

Mr. A. Fahnestock, of Lancaster, Ohio, writes thus: "The subject of fruit culture is one of the greatest importance, and to do justice to it would require a volume. I can here only give a few brief hints. In setting out orchards, select trees two years old from the graft—dig a good sized hole 2 spades deep, set the tree, and incorporate with the earth around it some well-rotted manure; cultivate the soil, but not with high crops. The trees will be benefited by applying every spring *Blandy's wash;* consisting of 3 gallons strong lye, 1 pint whale-oil soap, ¼ lb. saltpetre, and a handful common salt. No crops are more profitable to the farmer than orchards of early and late fruits. Peaches are worth in Columbus $2 to $3 per bushel; and in Cincinnati, as I am informed, they are never sold less than $3 to $5 per bushel. A peach orchard of some hundred acres at a fair distance from Cincinnati, with the view of supplying that city, would be a capital investment.

"In transplanting peaches, select trees one year from the bud. They should be examined twice a year, taking away the earth for a few inches from around the bark, and destroying all the worms that may be found. At the same time half a spade full of ashes or slaked lime may advantageously be applied to the tree."

Mr. John Kuhn, of Ashland county, Ohio, says: "Transplanted trees always succeed better if the earth is kept moist about their roots. This can be done by applying a light coating of coarse litter, as straw, chip-dirt, or rotten wood, on the surface around the body of the tree."

Mr. John Bell, of Floyd county, Ind., says: "The apple and peach are extensively cultivated here, and with considerable care. Our soil, climate, and convenient situation for market, offer inducements to fruit growers that are not entirely overlooked. We raise and ship south from this county, in favorable seasons, considerable quantities of green and dried fruit. Last year the crop was a failure here as elsewhere, from the severe frost in April. The curculio has been very severe on plums and nectarines, and we have made several experiments, as yet without success, to prevent their depredations."

On vine culture, Mr. Bell writes as follows: "This branch of husbandry is beginning to be better understood than formerly. Several small vineyards have been commenced, which succeed very well. The Catawba is considered the best grape for out-door culture in this climate, and less lia-

ble to mildew than the Isabella. Some of our German citizens, who practice not only a spring or autumn pruning, but also a judicious summer pruning of the vines, succeed admirably."

Mr. A. B. Florer, of Newport, Ind., says: "The apple, peach, and cherry do well in this climate. The usual time of transplanting is in April and November. I think the latter preferable. We have here all the best grafted varieties of fruit. Pear trees usually die, when ten years old, from the *blight.* Prairie orchards should be seeded down in clover, and should never be ploughed, for the roots run near the surface of the ground, and ploughing exposes these to the frost in winter, and to the drought in summer, both of which impede the growth of the tree."

In Racine county, Wis., "Fruit trees," says Mr. Perkins, "such as apples, pears, and quinces, are yet mostly young, but grow vigorously, and appear less inclined to produce fruit than a large growth of wood. They need root-pruning, or something to check the exuberant flow of sap. On some light hard soils, they bear abundant crops of fine fruit. Peaches generally do not succeed well, and in most places the crop is very precarious. Plums, some of the hardy varieties of cherries, currants, &c., bear profusely, and the fruit is of finer quality than I ever saw in the older States. The culture of the grape has as yet received little attention, although our soil is said to be well adapted to it, and in sheltered situations we have raised fine crops of the Isabella, and other early varieties. The wild grape is very plenty throughout the country."

The cultivation of the vine in Texas is thus spoken of by Mr. W. S. Keaghey, of Jasper county: "The vine, above all other fruits, is bound to succeed in this section of the country. A neighbor of mine, Dr. Seybold, a Prussian emigrant, has a small vineyard of about 100 plants, now four years old. They have borne two crops every year until the present, when, through the unusual quantity of rain, the second crop did not ripen. They are of the Isabella variety, and the wine is of fine flavor, and sells in the shops for Madeira." Mr. Pryor Lea, of Goliad, says: "But little attention has as yet been paid to the culture of grapes. One fact is established, however, that wine of excellent quality can be made from the Mustang grapes, which abound in all parts of the country. Some foreign grapes have already been introduced here, and succeed well. All this section of country will, without doubt, in time produce a variety of good wines. Southern fruits of all kinds promise well. Figs are yet bearing, (Nov. 22.)"

CULTIVATION OF APPLES IN THE NORTHERN STATES.

(BY HENRY F. FRENCH.)

It is a cold climate, this of New England, where we have frosts in nearly every month in the year; and it is a rough and stony land, compared with the regions of the South and West. Cotton, tobacco, and rice will not grow among us, and we cannot compete with other sections of the Union in the culture of wheat and corn, even; and many are inclined almost to curse the soil as ungrateful, and give over New England to the manufactures and the arts. Many regard agriculture among us as an unprofitable toil to the poor, and an expensive amusement to the rich; and it surely becomes every man,

when he may, to speak a word of encouragement to the owners of New England soil.

It is my belief that one of the true sources of agricultural wealth at the North, is to be found in the cultivation of apple orchards. It has already become a prominent object of attention in some parts of New England, and requires only to be appreciated to become vastly more interesting as well as profitable. But facts are more valuable than theories, and I will illustrate my idea of the profits of apple growing by a statement of what I know about two small orchards in my native town of Chester in the interior of this county of Rockingham; and I give the statement not as extraordinary at all, for I think hundreds of instances of greater profits might easily be found; but I give them merely as illustrations, and as a safe basis of calculation.

One of the orchards referred to is owned by Mr. Joseph Robinson. It covers about two acres of land. The trees are only from twenty to twenty-five feet apart, so that the branches are much interlaced, and the fruit is principally the Baldwin and Russet. The product, in 1849, was 260 barrels of marketable apples, which were sold at home at $2.62 per barrel, giving more than $680; and this may be reckoned net profit, as the fruit of inferior quality would pay all expenses of care of the orchard, and gathering the fruit.

In the year 1847, Mr. Robinson refused the offer of $600 for his apples *upon the trees*, to be gathered by the purchaser. This was an uncommonly profitable year to Mr. Robinson, because the general scarcity of fruit gave to his an additional value: but they show pretty distinctly what *may* be done. Upon careful inquiry, I am satisfied, that the net income of his two acres has averaged $300 a year for ten years past, and see no reason why it should not be as great for twenty years to come. This is the interest of $5,000, or a pretty satisfactory income, considered as the bountiful gift of our mother earth, whereby our neighbor is not rendered poorer, and no man has lost that which we have gained. I have charge of a small orchard in the same town, covering about half an acre. In 1847, I selected eight barrels of the fruit of it, and sold the remainder for $100 on the trees. In 1849, I gathered fifty-five barrels, for which I realized $125 above all expenses of care and cultivation for the year. These are small matters compared with grand operations in wheat fields and cotton plantations; but these smaller matters make up the wealth of the country. The hay crop, so important an item in our national income, is principally produced in this way, by small farmers in small quantities.

I will now give you briefly the mode of planting and cultivating apple-trees most approved in this county.

Select any soil, not so low as to be saturated with stagnant water, nor so sandy as to be dry. A granite soil is as good as any, and a slate soil perhaps equally good; but for convenience of cultivation I should prefer land not very stony. Subsoil it to the depth of eighteen inches, if practicable, and if not, plough as deep as possible, and excavate places for the trees eighteen inches deep, and six feet in diameter, and make the soil thrown out rich with compost manure before replacing it. Plant the trees, which should be two or three years from the bud, in the spring or autumn, as is most convenient. Many persons much prefer the spring, and no one, I believe, *prefers* the autumn. I have myself set them in both seasons, and have discovered no difference. Set them thirty-three feet apart, which will give forty trees to the acre. Keep the land under cultivation with hoed

crops, until it is too much shaded to be productive, and then let it lie fallow, with ploughing and harrowing enough to keep down the weeds. Apple trees will not thrive in sward land, I mean in land kept in grass. In all parts of the country, fruit trees set in grass land may be seen struggling desperately for dear life, and of no value whatever except as a warning against similar folly. It is true that if trees be forced to a very rapid growth, they will often be for a time unfruitful. To check this exuberance of wood, and render the trees fruitful, laying the land to grass for two or three years may be a necessary regimen, on the same principle that checking the circulation of the sap by bending down the limbs will force out fruit buds. Trees should be pruned high enough for cattle to pass under them in ploughing. They should be washed twice a year with soft soap and water. The borer is a troublesome enemy with us, and a cause of sure destruction, without great care. A wash of soap and water, or a solution of potash, will destroy the eggs of most insects; and the worm may be killed with a wire, by careful attention, as soon as he commences his work. He remains in the grub for two years, and during the first makes but small progress in his labor, and may be easily destroyed.

Apple trees, well cared for, will commence bearing in three or four years after setting, and in eight or ten years produce a good crop, and will endure for generations. Mr. Robinson planted his orchard fifty-five years ago, and still enjoys the fruit of his labor.

Trees highly cultivated will mature and decay, doubtless, much sooner than others; but a quick return is, on the whole, the true economy in the matter.

As to the species, I recommend the Baldwin and russet for this latitude for market fruit, because they are good bearers, and in season after the fruit raised farther south has gone by, and therefore command a higher price. Baldwins, in New Hampshire, are in season in January and February, and our russets are in perfection until June, so that we have scarcely any competition in the market. For exportation probably no fruit in the world is superior to that produced in our cold latitude.

One fact in regard to the Baldwin apple has attracted much attention, and is deserving of investigation, namely, that it bears, generally, throughout New England, only in the even years, as 1846, and 1848; while in the odd years its product is very small, not one-fourth as much. The small orchard under my care is an exception, and most, though not all, the trees bear plentifully in the odd year, and it is not very uncommon to see instances of the kind. Whether this be induced by the peculiarity of some season which has destroyed the fruit buds, and so brought the trees into bearing the succeeding year, or whether that species of apple, on some principle like that of the transmission of depravity from our first parents, has an innate propensity to fruitfulness in even years, I will not undertake to say. The fact is indisputable, and Baldwin apples are worth twice as much the odd year, by reason of their scarcity. The russet is not a great bearer, but bears every year. Most of the great bearers are fruitful only in alternate years. The bearing year of trees generally may be changed by removing the blossoms one year, or by any cause, natural or otherwise, which shall prevent the fruit maturing. Whether the experiment would succeed with the Baldwin is not to my knowledge ascertained.

From an acre of orcharding of forty trees, under proper treatment, at maturity, say twenty years from transplanting, one hundred barrels of fruit

would be a small crop, and its value ranges from one to three dollars per barrel. Throughout New Hampshire an abundance of suitable land may be had for twenty dollars an acre. The first cost of trees and setting out will not exceed twenty dollars an acre, and for several years, and until the trees commence bearing, the cultivation of the land for other purposes will be very little obstructed by them. The selling price of land is increased every year by their growth, and there can be no doubt, that with the facilities of steam navigation, the demand for apples, and especially those of northern growth, will increase beyond any present prospect of supply.

Now, why does not the subject receive its due attention? Why does not every farmer in New England plant an orchard forthwith, and while he surely adds to the value of his estate, provide a source of unfailing interest and satisfaction for his declining years? I have regarded the matter in a pecuniary light merely; but other considerations, perhaps not adapted to this occasion, will occur to every reflecting man. An influence is much needed in New England to counterbalance the roving propensity of her people; an influence which is nowhere so surely found as in the strengthening of home-ties by the union of labor with the works of nature. He who has planted a tree, will he not desire to eat of the fruit thereof? and he whose father has raised it, will he not feel it to be almost sacrilege to give it into the hands of strangers?

Patriotism has no basis so secure as in the love which man has for his home and the home of his fathers.

EXETER, NEW HAMPSHIRE, *March* 4, 1850.

ORCHARDS—THEIR CULTIVATION AND MANAGEMENT.

(BY ALLEN W. DODGE.)

IN accordance with a request made to me by John S. Skinner, Esq., of Philadelphia, I herewith furnish you with some remarks on the fruits, and the cultivation, care, and arrangement of orchards in New England, and especially in Massachusetts. It cannot be expected that much valuable information on this subject can be communicated, that is not to be found in the books; but such as has been gleaned from these and from my own experience in raising nurseries of fruit trees for the last ten years, for sale, and from frequent conversations during this time with skillful cultivators, is at your service.

The cultivation of fruit trees has of late received a far greater and more general attention in this country, than at any former period in our history. The public mind has waked up to the importance of this subject, and in some sections is roused even to a sort of enthusiasm upon it. To whatever cause or causes this new movement in fruit culture may be ascribed, such is unquestionably the fact. Books and periodicals in large numbers have been called into existence, devoted mainly to the diffusion of information on this subject. New varieties of fruits have been imported from abroad, or raised from the seed at home; and fruits of rare merits, which before were known only in districts where they originated, have been disseminated far and wide.

Nurseries of fruit trees, which formerly were confined to a few hands only, have now sprung up all over the country, so as to meet the increased demand for young trees, and, by a healthful competition, to place them within the easy reach of the humblest farmer and mechanic. Everybody who owns a spot of land, however small, is on the alert to plant upon it fruit trees; and this done, is year after year busy in providing for their health and growth. In a few years he begins, if his labor has been well directed, to witness the result of his efforts, in rich fruits—to him all the richer because of his own raising. The vast amount thus, within a short period, added to our national wealth and happiness, it would be difficult to compute. Suffice it to say, it is no speculative or visionary scheme; but a safe and permanent investment that will yield golden dividends, so long as our soil and seasons shall continue to be as propitious as they have heretofore been.

In New England this increased attention to fruit culture has been most conspicuous. The climate, with its late springs and early cool autumns, favors especially the growth and maturity of winter apples; and to these the cultivators have mainly directed their efforts. Other fruits, such as the pear, the peach, and the cherry, receive far more attention than in former years, but to a limited extent, compared with winter apples. These, indeed, may be considered the staple fruit of New England. They constitute by far the larger proportion of the orchards, which are to be seen in such numbers on her plains and hill-sides. The demand for winter apples has kept up with this new zeal in raising them, and has given to it diffusion and activity. The home market is not yet glutted, nor fully supplied; though alarms to this effect have continued to be sounded by those who are ever looking on the dark side and foreboding evil, whenever any thing is attempted beyond the horizon of their narrow vision. But to such as watch the signs of the times—such as mark the growing population of our widely extended country, and note the popular taste for good fruit strengthening by what it feeds upon, these alarms pass as the idle wind.* These men continue to plant new orchards and to cultivate and renovate old ones, in full faith that they shall not labor without a reward.

The care and management of orchards, in this section of the country, constitute no inconsiderable part of the work of a farm. The notion that a fruit tree will live and flourish, on being thrust anyhow into the ground, and left to take care of itself, has here long been exploded. Equal pains and cultivation are now bestowed upon orchards as upon tillage land, with the knowledge that, without these, good crops of large and fair fruit can no more be raised than good crops of corn or potatoes. A small number of trees well taken care of, are found to be more profitable than a large number neglected or poorly cultivated. In forming an orchard, the first object is to bring the ground into good tilth, by cultivating it for a year or two with hoed crops. This is unquestionably the better practice, though orchards are frequently planted in land newly broken up. In the former case, the young trees find at once a good mellow soil in which to strike root; in the

* Besides the home market for fruit, the constant and rapid communication by steam between this country and Europe would seem to open for our long-keeping winter apples a demand abroad, of which the most sanguine can hardly conceive. The shipments that have been made to England warrant the conclusion, that a well-keeping, juicy apple would have there an immense sale. And if ice—another product of New England—can be transported to the East Indies, so as to pay a good profit, why may not the apples seek the same market, and with similar success?

latter, they may live, but they must wait for the soil to be made rich and fine by cultivation, before they can flourish. Thirty feet is about the distance apart at which trees are usually set in an orchard. If planted much closer together they obstruct each other, and run up tall, instead of spreading their branches wide, as is the habit of most apple trees, if space is allowed them.

The holes in which the trees are set should be dug wide enough to admit all the roots without bending, or diverting them from their natural direction, and if somewhat wider all the better. The subsoil or dead earth should be removed from the bottom at least a foot deep in shallow soils, and its place supplied with good surface soil, or compost. A compost of well rotted manure and meadow mud is admirable for this purpose, and for filling the hole when the tree is set. Care should be taken not to set too deep. The roots need the influence of the atmosphere—of light and heat, as well as of manure and rains—and languish if buried below this influence. It is a safe rule to set no deeper than the tree stood in the nursery, and this can be easily determined by its appearance at the base. Two persons are needed to set out a tree properly—one to hold it steadily (without shaking it) in its true position, and the other to place the roots and the soil around. Every fibre should be extended in its proper direction, level and not dipping, and carefully surrounded with the compost. No vacant places or cavities should be left in covering the roots, nor injury done to them by the hand or spade. In filling in the soil or compost upon the roots, it is best to throw from the roots to the circumference of the hole; as in this way the roots are less liable to be deranged from the position in which they have been placed, than by the opposite practice. After the hole is two-thirds filled, some cultivators pour in water sufficient to moisten and settle the soil, but the more common practice is to dispense with water altogether. When the soil is level with the surface, tread it down, and if it be in the spring, cover with mulch or litter of some sort, but remove it in the fall, lest it form a harbor for mice. This mulching of newly transplanted trees is by all means to be recommended, as it generates and retains in the ground a sufficient degree of moisture to carry them safely through the long and severe droughts that often occur in summer.

As to the size of trees suitable for planting in an orchard, such as are of two or three years healthful growth from the bud or graft are preferable to those of greater size and age. The larger the tree, the larger and more numerous its roots, which are consequently the more exposed to injury on being removed. A tree should not be taken from a soil much richer than that to which it is transferred. If it has been accustomed to a plenty of good food, it will pine for want of it, as surely as any animal under similar circumstances. Newly transplanted trees will sometimes rock in the ground for want of sufficient roots, so that no new fibres can be formed, and they will then cease to grow. If this happens, a few heavy stones buried in the soil, near the tree, will give to it the necessary stability. The soil may be left around the tree, if planted in the spring, a little dishing to catch the rains; and if it be in the fall, a mound of earth heaped about the tree serves the double purpose to throw off the water and support the tree in winter. This, however, should be levelled on the return of spring. With regard to the question whether spring or fall planting is preferable, a difference of opinion exists, but the latter is never recommended on moist and heavy lands. On all other soils both are practiced

with success, though by far the larger number of farmers set out their orchards in the spring. But if a very dry summer follows, spring planting is more liable to a failure than autumn. When the latter is practiced, it may be done at any time after the leaves begin to fall, and while the ground is unfrozen; when the former, after the ground has become settled and warmed, and before the leaves begin to expand.

As to the soil adapted to the culture of the apple, it may be made to grow and even to flourish on almost every description, though it succeeds best on mellow deep soils. If the soil be thin, it must be enriched—if wet, it must be thoroughly drained—if dry and gravelly, apply plenty of meadow mud with the other dressing—if rocks abound, they will render good service in promoting the growth and productiveness of the orchard. It must be remembered, however, that some kinds of soil are more suitable than others for particular kinds of apples. The Roxbury russet and the Hubbardston nonsuch, two of our most celebrated winter apples, require a strong clay loam to produce large and fair fruit; whilst the Baldwin, which stands confessedly before all other winter apples in New England, fruits well and gives the finest flavored apples upon a soil of a light loamy nature. The experience of any fruit-growing district soon teaches the varieties best adapted to its soil, and the practice of intelligent cultivators is conformed to that experience.

The location of an orchard should not be so elevated as to be exposed to the full violence of the winds and storms. In other respects, an orchard may occupy any position that will best suit the convenience of the farmer. Some recommend a northern, and some a western exposure on a hill-side; but on farms lying on the southern or eastern side, there is no other choice left, and these, so far as my observation extends, are as good as any. Indeed, the multiplicity of rules on this and other points laid down in the books will often embarrass the beginner, unless he keeps his eyes open to what others have actually accomplished, and exercises his own judgment and common sense. When the orchard is set out, and every thing done in the matter of transplanting to insure success, the young orchardist must not rest in the vain expectation that his care and labor are no longer needed—that his trees will thereafter take care of themselves and come into bearing with no other help than the start thus given them.

A tree does not, like corn and other cultivated crops, attain its growth and perfect itself in a single season;—nor in two seasons, nor a dozen. It is long in reaching maturity, and, with proper care and culture, will long remain vigorous and fruitful. The orchardist should, therefore, exercise due forecast, and from year to year see to it that the ground is properly stirred and manured, if not on the entire field, at least around every tree. He should ever bear it in mind, that it is only by good culture that he can be sure of the thriftiness of his trees, and of the abundance and good quality of his fruits. In a word, the great secret of a profitable orchard is good culture and good manure; the one opens the soil to the influence of the atmosphere, the light and heat, the dews and rains; the other supplies to the soil the food needful for every new crop of fruit, and which is, to some extent, exhausted by every crop taken from it. The thriftiest and most productive orchard I have ever seen was kept every season under cultivation;—it was ploughed, manured, and planted to some crops, (such as white beans, or fodder-corn,) not of an exhausting nature; and from it 1500 barrels of large merchantable apples have often been gathered in a single year. On

inquiring of the owner why he did not keep it in grass, as the soil was admirably adapted to the growth of the best English hay, he replied that he could not afford it—it would pay better by his present system of management than by any other. The trees in this orchard, though of considerable age, were so thrifty that their bark was as smooth and glossy as if it had been polished—no cracks, moss, nor shaggy exuviæ were to be seen upon it. How striking the contrast between such trees and those that have been neglected or poorly cultivated, no one who has even witnessed it, needs to be told; and not less striking is the contrast between the profits of the two descriptions of trees. When swine will fatten without good food—when cows will yield large messes of milk without rich pastures—when steam-engines will go without being supplied with fuel—then may we expect to behold orchards without manure or cultivation growing vigorously and yielding good crops of large and fair fruit.

The fear is sometimes expressed, that orchards may, by high culture, be forced to a premature old age. In ninety-nine cases in a hundred, there is not a shadow of danger in this respect. But granting that there may often be danger here, far better that our orchards should yield a large income for twenty-five or fifty years in succession—and then die, than that they should linger along to a hundred, without half remunerating the owner for his land and labor. No, there is nothing to be feared from the high cultivation of fruit trees—the fears are all the other way. The man who doles out to his orchards a scanty supply of food, gathers accordingly; while he who manures bountifully, has bountiful harvests. And this fact is of the more consequence to the farmer, as large and fair fruit will always command a quicker sale and larger prices than that of ordinary quality; and as the market becomes better supplied and competition more active, this difference will become greater.

Other things besides good culture are essential to the success of fruit-growing. The orchard must be guarded from cattle and sheep, and protected from the ravages of insects. Unceasing warfare must be waged against the caterpillar, and especially the canker-worm and the borer. The habits of these insects and the means of destroying them are well known—all that is wanting is energy and perseverance in applying that knowledge. The orchard must be judiciously pruned, not severely as is too often done; decayed and interfering limbs and suckers being almost the only ones to be removed, and these nicely severed with the saw or knife, and never hacked off with the axe. In the gathering of the fruit, too, the utmost care should be observed—every apple that is intended to be kept any length of time should be picked by hand, and laid carefully in the basket, and this should be as carefully emptied into the barrel. The pains thus taken with the fruit until it is offered for sale in the market, well repays the careful husbandman. His fruit soon attains an enviable character—his sales are quick and at enhanced prices—his pride, and it is an honest one, is gratified—and, what he mainly looks at, his income is greatly increased.

The only thing that remains to be noticed in this communication is the varieties of apples that are found to be most profitable for the orchards in this section of New England. Of course, I can speak from my own knowledge of but a very limited extent of territory. And I would observe, especially, that apples that originate in other parts of the country, and have a great reputation there, are not often found to succeed here. The Newtown pippin, the famous apple of New York, is worthless with us. The Swaar,

so celebrated in New Jersey, instead of a sound and heavy quality, is light and corky. And so of many other varieties; the change of climate and soil produces a change in their character. Indeed, I much doubt whether the Northern Spy, whose fame has spread like a meteor from the lakes to the Atlantic, and which is now so eagerly sought after by our amateur cultivators, will be found to meet here the extravagant expectations formed respecting it. It has not, that I can learn, as yet been fruited in New England; of course its value is experimental here, and may sadly disappoint thousands who are propagating it.

Our best orchards raise but few varieties of apples, and those few of decided excellence, and well known in the markets. They confine themselves to such as produce well in most seasons, rather than plant those, for the sake of variety, of which only a crop may be obtained once in three or four years. And especially do they endeavor to select those that are found to suit our latitude, which are generally those that are indigenous, but not always, to the soil of New England. Of summer apples, the best and most productive are the early-harvest and early sweet-bough. Of fall apples, the Porter, the fall Harvey, Kilham Hill, the Lyscom, and the Gravenstien. The latter, though of European origin, has attained a very high rank, both on account of the thriftiness of the tree and the excellence and productiveness of its fruit. Of winter apples, the Hubbardston nonsuch, Rhode Island greening, Baldwin, Roxbury russet, and Danvers winter-sweet comprise the chief varieties to which the largest and best orchardists confine themselves. There are many new varieties coming into favor, but the shrewder class of our farmers choose to wait and see, before they run after them.

Hamilton, Mass., *October* 15, 1849.

ORCHARDS AND FRUITS IN MICHIGAN.

Troy, Oakland Co., Mich., *February 5th*, 1850.

The apple trees in this region that have come into bearing were generally natural fruit. These have been engrafted to a considerable extent with the standard varieties, such as the *Rhode Island greening*, *Esopus Spitzenburg*, *Swaar*, *seek-no-further*, &c., which are all good standard varieties. Some have sought for varieties of large size, such as the 20 *oz. pippin*, *pound-sweeting*, *gloria mundi*, &c., which are much inferior in quality. Fruit raised here will compare in quality, if not surpass that of the best fruit-districts in New York. The climate and soil are favorable for peaches, quinces, apricots, nectarines, &c.

The farmers in the first settlement of this country could not obtain cultivated trees, and were obliged to transplant common fruit. This deficiency is supplied now by the establishment of nurseries in different parts of the State, which can supply a large amount of trees of the best varieties of fruit in cultivation in the country. With the *means* of the farmer, increases the desire to improve in the cultivation of fruit. The establishment of horticultural and agricultural societies has served to stimulate the people to consider the importance of improving in fruit culture. The natural advantages for raising fruit are good here. There is a great variety of soil which could be adapted to different varieties and different kinds of fruit, as the knowledge

of their requisite soils is ascertained. There are also advantages of location here. It has been found that fruit is raised every year upon the high ground, and that at an elevation of 15 or 20 feet above the immediate ground around, fruit trees are not affected by frost in spring. So that if a fruit tree was growing upon a mound 15 feet high in an orchard, it would escape a severe frost, while all the remainder of the fruit in the orchard would be destroyed. There are also a great many small lakes in this State, some of them very picturesque, with beautiful sites for dwellings. These waters seem to soften and dispel the effects of frost, so that fruit trees invariably bear abundantly upon their borders. If these locations were improved and properly planted to fruit trees, there is no doubt a large surplus would be produced every year, and the business be made very profitable.

Insects.—The caterpillar and the apple-borer are those which affect the apple trees most here. The first is easily destroyed by attacking the nest when first formed; with a long stick with a crotch in it, the nest can be taken off and crushed with the foot, or if a sponge be dipped in spirits of ammonia and attached to the end of a long pole, and turned around slowly in the nest, every insect coming in contact with it will be killed. The attacks of the borer may be prevented by keeping the bark smooth and washing it every spring with soft soap or weak lye. The most destructive insect we have to contend with here is the *curculio;* for the last five years we have raised no plums, apricots, or nectarines, and the early peaches have been materially injured by them. We have heard of various methods of preventing their ravages, but I am convinced that none will prove effectual but destroying the insect, either in the larvæ or winged state. How far the insect would migrate in one season I cannot say, but that it can fly pretty smartly, there is no doubt. Any person can convince himself of the fact by catching a few of them and placing them upon the open palm of the hand, when they will soon fly away. The experiment is being tried here of planting where hogs run exclusively, and having no other plum trees upon the farm. The disease of the pear tree called *blight*, or *fire-blight*, has prevailed to some extent here, but as far as I have observed, it has been confined to trees that were brought from the State of New York in the early settlement of the country, and to new sprouts taken from the roots of bearing trees, which have been neglected. In Detroit there are seedling pear trees said to be over 100 years old, which bear constantly, and seem to bear very thrifty. I believe they have been free from blight; they are very large trees, some of them 50 or 60 feet high. I have observed a great difference in the flavor of fruit from different trees of the same variety in one orchard, and know not what to attribute it to, unless to the influence of the stock upon the scion. A neighbor of mine, who is a very close observer, took scions of the *Esopus Spitzenburg*, and grafted over a tree which had previously been grafted to some other variety; the fruit from this tree far surpasses any other Spitzenburg he raises in flavor, showing a decided influence of the stock upon the quality of the fruit.

Grapes, Wine, &c.—The Isabella and Catawba grapes are those mostly cultivated here; but they need a southern exposure, or a protection of a wall or tight high fence, to ripen their fruit perfectly. They have not been cultivated for making wine. I have a grape called the *Bradley*, which ripens three or four weeks earlier, is a great bearer, but not as large a grape as the Isabella. It is high colored, and makes a wine similar to Port.

These varieties grow well and bear abundantly; the fruit is not subject to decay in ripening as at Cincinnati. I have made wine from these grapes upon a small scale, and it could be made a good business.

Respectfully yours,
A. C. HUBBARD.

Hon. Thomas Ewbank,
Commissioner of Patents.

THE VINE OF NORTH CAROLINA.

Washington, *June* 1*st*, 1849.

According to my promise in submitting some observations on the fisheries of the United States, and principally those within the waters of my native State, I proceed to offer such information on the products of the vine within that State, as I may possess.

In witnessing the miserable soils on which the vine and the fig flourish, I have been forcibly struck with the proof of maternal kindness of nature in the distribution of her gifts to her children in this nether world, most evident in the growth of the grape. A person navigating the coast of North Carolina and casting his eyes on her sandy beach, her naked hills with an occasional oasis of pine and live oak, would pity the inhabitants that were compelled to dwell on a soil suffering under the curse of sterility, and would naturally infer that it was out of the power and the art of man to draw a subsistence from it. Upon a close examination however, he will find that the grape, the fig, and all the culinary vines, as the pea, the sweet potato, and the melon, flourish in higher perfection, with an equal share of attention, than in the most favored soil. In fact the white grape commonly called the Scuppernong, is the peculiar growth of this sandy region, and all the vines of a similar kind and the growth of a similar soil, are the offspring of this original stock. It is true that the cereals, as Indian corn, wheat, and oats, will not grow in this sandy region, neither will the grape produce in the richer soils of the neighboring counties. Upon a fair balance being struck, in a comparative estimate of the variety, the amount and the value of the products of this sterile and sandy strip of land, with the adjacent islands of Knotts and Roanoke, extending from the Virginia line in Currituck and Princess Anne, to Roanoke inlet, we will find that nature in her impartial administration, has placed it on an equal footing with any given quantity of soil on the main land. In making up the sum of the respective advantages and disadvantages of these two widely different sections, we should add to the sandy district, the wild fowl and fish, in which it abounds, and its salubrity of climate. Nature has designed in this contrariety of soil and production, to introduce exchange and barter between the people of the two regions, and through that medium, trade and social intercourse, which bring in their humanizing train the art of ship-building, and its tributary manufactures. The wisdom and benevolence of nature then are evident in all her works, in the variety as in the abundance of her favors. Our energies, our genius, and our industry, are stimulated and put into healthy activity by that wise decree, that we must earn our livelihood by the sweat of our brows, and it is by thus being compelled by necessity to obtain in a fair exchange through the peaceful channel of commerce,

what others possess, while we have what they want, that our social and political happiness is consummated. If every man produced all he wanted, if all his necessaries, comforts, and luxuries, were within his hands' reach, we should merely vegetate, "like the fat weed that rots on Lethe's wharf."

The white grape finds its most genial soil in the sands of the North and South banks of Currituck county and the Island of Roanoke, three miles from the coast, and lying at the foot of Albemarle sound. Every man's dwelling is ornamented with a wide spread vine, reaching in many cases over an area of a quarter of an acre. Many vines are so large and wide spreading that tradition traces their planting to the first colonists under White and Lane. These vines have grown to over twelve inches in diameter, and their branches extend in all directions as far as it is thought convenient to afford them the requisite scaffolding and props. The posts which uphold the beams and the rafters with the heavy weight of the mass of branches and foliage, are of the pitch pine, and although many have been standing more than a century they are as sound as on the day they were inserted.

The largest vines produce from fifty to one hundred bushels of fruit, which is sold to the wine makers and other consumers at an average of one dollar per bushel. They are the main crop of the bankers and islanders. They grow in clusters of six or eight, generally about the size of an ounce ball or common marble, are of a pale yellow color when ripe, and are the most juicy and luscious of all grapes. They are sweet of flavor, thin skinned, contain a soft pulp that dissolves in the mouth, and generally but few seeds—five or six. The vine grows so luxuriantly, that in the course of two or three seasons the branches run over the bearers or scaffolding, descend to the ground and take root wherever they touch the soil. Joints of these, with the fibrous roots adhering, are the best and safest cuttings for transplanting, and many large vines are thus propagated in districts a hundred miles distant, where they bear well in similar sandy soils. There is one remarkable trait in the growth of this grape that I have observed with much interest. Out of ten seeds sown only one will produce the white grape, the other nine producing the common black or purple fox grape, of very inferior flavor and value to the original white. As soon as the foliage appears a few inches above ground, you may tell by sight which is the genuine white, as it is of a lighter and paler color than its brethren. The black variety will grow in the richer soils of the upper country, but the white will not bear fruit there. The inhabitants of Roanoke and Scuppernong try their hand at making wine in their rude way, but they do much injustice to this excellent fruit, by putting it up just as it runs from the press, without filtration. Much of the pulp and seed are thus intermixed with the juice, and to mend the matter, the wine is not allowed to ferment before they suffocate it by pouring into every barrel of it at least five gallons of new apple brandy. It is of course then nothing more than preserved grape juice, and but little better than new cider, and when taken to market in that state seldom commands over $12 or $15 per barrel. A basket of the grapes will produce with moderate pressing fully three gallons of pure juice.

In 1815 I determined to give this grape a fair trial. I hired a small craft and with two hands went down to Roanoke island, properly prepared with an improved wine press, casks, and baskets. I set up my press in a central part of the island, which is ten miles long, and about four miles wide. I notified the inhabitants that I would give two dollars a bushel for all ripe, clean, hand-picked grapes they would deliver to me. This liberal

price stimulated their activity, and they brought them in as fast as I could press them. The press was lined with cotton bagging or sack cloth, and the platform, raised two feet from the ground, was well calked and pressed together by lateral wedges. The stand-cask into which the wine was first poured contained two layers of filtering material, and the wine came out in a small stream at the bottom perfectly clear. I placed other clean stand-casks of the capacity of 60 gallons each, under a shed convenient to the press, into which I emptied the wine thus obtained. These stand-casks I left uncovered at the top in order to watch the process of fermentation. The wine fermented freely, it being about the 20th of September, and the weather temperate. As soon as I saw the crust at the top begin to break and separate before its precipitation, I racked the wine off at the bottom and put it into clean iron-bound casks. I had previously fumigated the casks with slips of old canvas dipped in melted sulphur, and when the casks were half filled I incorporated the fume of the sulphur and the wine by well shaking the casks, and repeating the motion at intervals till nearly full. I then added a gallon of good old French brandy to the barrel, and bunged it up. This plan stopped the fermentation at the right point, and allowed the wine to settle and mellow before it reached the acetous stage of fermentation. I put up a dozen bottles of the wine when I racked it off while in a state of effervescence, and on opening some a few months afterwards, in the presence of some invited guests, it was highly charged with fixed air, flowed over the glasses in a white foam, and was pronounced fully equal to the celebrated product of France.

We let the wine in the pipes remain untouched till the end of the year, and when broached and tried in the presence of good judges, it proved to possess a rich and superior flavor, of an oily consistency, with a slight smack of honey sweetness. It fully equalled the finest Muscat wine, which it most resembled. We could readily have sold the whole of it at $2.00 per gallon. It would therefore pay well for the trouble and expense of its manufacture, if done "secundum artem." Any capitalist who would enter into the business on a large scale at Roanoke Island, where he can buy the proper kind of land at $2.00 the acre, and who understood the best process of making wine, would find it a more profitable business than farming or grazing on richer lands, and would prove himself a public benefactor.

The white grape is extensively cultivated on the banks of the Scuppernong river, where the soil is light and sandy. It is their principal crop, as the land will not grow corn, and they have to rely upon their wine to lay up their annual store of Indian corn and flour by barter and trade.

In the compendium to the census of 1840, the report for the county of Washington, in which the Scuppernong river is situated, gives only 4.075 gallons. The quantity must be more than doubled since, and the wine improved by a better course of manufacture. If to this we add the product of Currituck, including the north and south banks, and Roanoke Island, we shall be within bounds in estimating the amount at ten thousand gallons.

Cuttings of the White, or Scuppernong grape have been distributed over a large extent of country, and it flourishes on the seaboard of South Carolina and Georgia, and in the neighborhood of Mobile, where it finds a congenial soil and climate. I do not believe it could be cultivated to any advantage north of the 37th degree of latitude, nor at any great distance

from the sea to the south of that.* Its thick foliage and closely intertwined branches afford a cool shelter to the cultivator, and the fig tree grows to a large size around it, and the happy occupant may truly be described as sitting under his own vine and fig tree, with no one to make him afraid.

Before I conclude I beg leave to propound, through the marshal of the district to the leading proprietors of the vineyards in this quarter, which is confined within a narrow circle of not much over 100 miles, the following questions:

How many years since your vine was planted? How old was it when it commenced bearing? How many pounds weight did it produce the 3d and 4th year? How many bushels do you gather in the season, and how many gallons of wine do you make? What is your process of manufacture? What quantity of wine would you judge was produced on the shores of the Scuppernong river? Where do you find the best market for it? Have you improved on the method of 1820 in the making of wine? What is the ruling price of wine when first offered for sale, and does its value increase with age?

ROANOKE ISLAND.

How many gallons do you make, and how much do you estimate is made on the island in any given year? Do you sell any considerable quantity of the grapes at the landing and ports above, and what the average price of the fruit by the quart or bushel? Is there any falling off in the quantity of wine made in your quarter? Is pruning thought necessary, and is it practised to any considerable extent?

All of which is most respectfully submitted by

LEMUEL SAWYER.

Hon. THOMAS EWBANK,
Commissioner of Patents.

TRANSPLANTING AND TREATMENT OF GRAPE VINES.

MOUNT CARMEL, CLERMONT CO., OHIO, *Nov.* 1849.

DEAR SIR:—In compliance with your request for information on the Cultivation of the Vine, I will respectfully state that my experience convinces me that a rich, deep, dry soil, is by far the most conducive to the vigorous growth and longevity of the grape vine. The numerous vineyards in various situations in the vicinity of Cincinnati afford good opportunities for observation and comparison. The *Catawba* is the variety chiefly cultivated. I consider the best mode of preparing the ground for a vineyard is to trench it with the spade to the depth of two feet, which costs about $200 per acre: although good preparation is made with a sub-soil plough at much less cost. Strong plants (two years old, if possible) are better for planting than cuttings, as they are more certain to grow, and bear one year sooner. When the vineyard is in bearing, I find it to be good practice to manure well every other year. I apply 20 two-horse loads to the acre, and spade it in 6 inches deep; this covers it better than the plough, and makes it look neater. I prune close in clear dry weather in February, leaving one cane of 10 or 12 eyes to make bearing wood for the next year. I bend down

* Mr. Affleck, of Adams county, Miss., an eminent horticulturist and agricultural writer, states that the Scuppernong is improved by removal to the vicinity of Natchez.

the canes and tie them to the stakes in March, when the buds are fully swollen and near breaking out; by deferring the tying until this time, the breaking of the terminal buds is insured, and the vines remaining free to the agitation of the winds, are less liable to injure from frost and sleet than when tied earlier. I keep the ground clean and loose with the hoe and frequent use of the one-horse harrow, by which means I insure an early and vigorous growth. When the shoots have grown from 10 to 15 inches in length, I tie from 2 to 4 to the stakes, from which I select bearing wood for the following year. I then pinch off all the lateral shoots, as soon as the third leaf is developed beyond the last bunch of grapes. I avoid disturbing the foliage during the time of blooming. When the fruit is well set, I watch it closely: if the weather is showery and mildew appears, it is best to roll the ground with a heavy roller and make it as solid and impervious to rains as possible, and let it remain so all summer. I also make shallow cross drains to lead the water into drains, which are made at every 4 or 6 rows, through which the water passes into one large deep cross drain, at the end of the vineyard. When the foliage becomes injured by frequent showers and scorching sunshine, I allow the laterals to make more foliage than usual, with a view to keep up a healthy circulation in the fruit branches, and also to afford shade and protection to the fruit. I am careful to keep the vines tied to the stakes to prevent the winds from breaking the shoots intended for the next year's bearing, and to give a free circulation to the air, as well as a neat appearance. By this mode of cultivation I saved one-fifth of my crop of grapes the past season, which was an average of more than one hundred gallons per acre. One bushel of bunches of grapes yields nearly four gallons of wine. The past season has been very unfavorable to vine growers, and nearly all vineyards have suffered severely from the rot in the grapes. Much difference of opinion prevails as to the cause of the rot, and some gentlemen of much practical experience now declare that vineyards planted on a dry gravelly subsoil will escape the rot. This has proved to be the case the past season with many vineyards thus planted, but it is not invariably so.

The vine in its native state twines around our forest trees, and flourishes and bears fruit beneath their shade on our cold swampy clay lands. I consider the rot to be caused in some degree by the influence of the atmosphere, the sudden changes from heat to cold, and frequent showers alternately with hot sunshine, which injures the foliage and thereby impairs the circulation of the sap. The rot soon follows, and continues its ravages as long as the weather remains wet and unfavorable. I know of many instances where branches of vines having been accidentally protected from the sun and wet weather, have borne fine, perfect fruit, while other branches of the same vines that were exposed lost nearly all their fruit. I would suggest to amateur cultivators to erect copings of from one to two feet in width over their grape trellises; they will also protect the vines from the late spring frosts and doubtless enable them to grow the *Herbemont*, *Ohio*, and other tender varieties with better success. The coping should be proportional to the height of the trellis; a high trellis will require a broad coping.

Very respectfully yours,

ROBERT NEALE.

Hon. Thomas Ewbank,
Commissioner of Patents.

OATS.

"What varieties have you tried, and with what results, particularly as to time of ripening—what their estimated value as compared with corn as food—is the cultivation of the oat becoming more or less popular, and for what reason?" [*Circular.*

We give below a few only of the many answers received to the questions contained in the circular. We would gladly publish many more extracts on this subject, but want of space prevents.

Mr. D. D. Marsh, of Sullivan Co., N. H., writes as follows: "The cultivation of this crop has been more neglected than any other of its value; and hence has become less popular. Owing to the severe drought during the past season, not more than half a crop has been secured in this section. I consider it an excellent fodder for all kinds of stock when harvested early and fed in the straw. Weight by law, 30 lbs. per bushel."

Mr. Harvey Huntoon, of Unity, N. H., says: "The cultivation of oats is becoming more and more popular from the little labor required. The common kinds succeed best in this climate. They usually sell at half the price of northern corn, and yield about 40 bushels to the acre."

Mr. Loring Dean, of Manchester, Vt., says: "Common northern oats are principally raised; yield from 20 to 60 bushels per acre; weight, 32 to 35 lbs.; ripen from 10th to 20th August; about one-half the value of corn. The cultivation of oats is becoming more popular, as they are considered very valuable as feed for horses, and a sure crop."

Mr. Samuel Wells, Northampton, Mass., writes: "Common varieties only grow in this section; a good crop, yielding from 30 to 40 bushels per acre; mostly fed to cattle and hogs with corn, and without corn to horses. This is considered our surest crop, but not so profitable as some others."

Mr. Allen W. Dodge, Hamilton, Mass., writes: "The most esteemed varieties are the *Bedford*, the *Kilham*, and such other varieties as are not subject to mildew. Oats are not fed here to cattle or swine, but only to horses. Their value is hardly to be compared with that of corn. Probably less cultivated than formerly in this section."

Mr. John G. Clarke, of South Kingston, R. I., says: "The *white unbearded* oat is the kind mostly grown; weighs 30 to 35 lbs. Another variety, the *black bearded* oat is much raised; also, a kind known as *English* oats, and are highly esteemed by farmers in the vicinity of the sea and bay. The latter require a strong heavy soil, have a large, full grain, and weigh several pounds more to the bushel than the first-mentioned kinds. The crop this year is better than last, although somewhat injured by the drought. We consider one bushel of corn equal to two of oats."

Mr. Myron Adams, of East Bloomfield, Ontario Co., N. Y., writes as follows: "In most parts of western New York oats are a secondary crop in importance, and are merely grown for home consumption. But in some counties, where wheat is not raised, oats are a prominent crop. The varieties cultivated are a mixture of the white and black oats. The yield, under good culture, and on rich lands, varies from 60 to 100 bushels. The best crop which has come under my personal observation yielded 106 bushels per acre. They are generally grown on poor lands and in a slovenly man-

ner, and in such cases produce about 30 bushels. Cost of cultivating oats may be set down at from $6 to $10 per acre.

Mr. J. J. Thomas, of Macedon, Wayne Co., N. Y., says: "This crop is becoming less and less popular among intelligent farmers, as it cannot well be brought into rotation. It is giving way in many instances to the culture of corn. On the other hand, the price of oats has risen of late years, which has induced many to increase their crops. They are estimated at about half the value of corn, as food for animals; 32 lbs. is the standard weight per bushel. The yield in some instances has amounted to 50 or 60 bushels per acre, but last year, on account of dry weather, it did not average more than 25 bushels; price from 30 to 40 cents per bushel."

Mr. Seth Severance, of Oswego Co., N. Y., says: "In this section oats are a very important crop; and their cultivation is increasing, as they find a ready sale at remunerating prices, and may generally be considered a very sure crop. From my experience, I think they should be sown as early as the condition of the ground will admit. By this method they are less liable to suffer from drought and rust, and have a larger growth and plumper berry; value to feed, about three-fifths that of corn."

Mr. S. Turbett, of Port Royal, Juniata Co., Pa., says: "I cultivate only the common white variety; ripens from 20th July to 1st August; yields 40 to 45 bushels per acre; about half the value of corn for feed; becoming less popular on account of exhausting the soil."

Mr. R. L. Colt, of Paterson, N. J., writes that "the climate in New Jersey is too warm and dry to produce good oats—average 40 bushels to the acre, weighing 28 to 32 lbs. per bushel. The variety called the *Potato* oats weighs the heaviest, and produces most of any kind cultivated here."

Mr. W. P. Morgan, of Princess Anne Co., Va., says: "The *Poland* oat has been cultivated for many years in this county. A few years since, Mr. John Tazewell, one of our most scientific and wealthy farmers, introduced the Russian seed, which for a short time did remarkably well, and produced the most prolific crops ever witnessed in this part of the country. It soon, however, deteriorated, and dwindled down to the common oat. This crop is universally considered less profitable and more exhausting to the land than corn or wheat, and farmers raise only sufficient for their own consumption, as a change of feed for horses."

Mr. John Davidson, of Iredell Co., N. C., writes thus: "Good crops of oats can be depended on with more certainty than any other grain in this section. The *ruffled* oat is very much cultivated, and highly esteemed. It is 2 weeks later than the common kinds, and ripens about 15th of July. Oats are used principally as feed for horses, and I think them equal, weight r weight, to corn."

Mr. Daniel Meek, of Knox Co., Tenn., says: "I have tried the *Irish*, the *common*, the *ruffled*, and the *side* oats, and prefer the *common-white*, as they stand up better, and ripen the first week in July, 10 days earlier than any other kind. I consider them better than corn for horses, and from the certainty of the crop and the little labor required, they are becoming more and more popular in this region."

Mr. M. Barnett, of Benton, Ky., writes as follows: "The *black* oats are mostly cultivated here. They yield well, ripen about first of July, and are preferred to corn as food for horses and hogs; the latter will grow faster on oats than on any other raw food, and are frequently turned into

fields of this grain when it is in the milk. The cultivation of this crop is increasing from its certainty, and also from its coming to maturity at a time when other food is scarce."

Mr. Charles F. Ingalls, Lee Centre, Ill., says: "The *black* and *small-white* varieties are the most profitable. The *barley* oat has too heavy a straw, and is liable to fall. My method is to plough the ground in the fall, and to sow *early* in the spring, 3 to 4 bushels per acre. If sown late, oats have a heavy straw, but a light berry."

Mr. Wm. A. Hacker, of Jonesboro', Ill., writes: "There is much difference in opinion among our best farmers as to the relative value of oats and corn as feed for stock. But oats are undoubtedly better for horses. Their culture is becoming more extended from the increase of population and consequent demand. Grain of all descriptions is raised and exported in large quantities from this county."

Mr. J. W. Calvert, of St. Francis Co., Ark., writes as follows: "I have tried three varieties, the *black*, the *white*, and the *ruffled*, and consider them all a sure crop of 20 bushels per acre. I prefer the *ruffled*, as it has a heavier straw, and yields better than the others. The cultivation of this grain is advancing, but not very rapidly, owing to the ravages of the black-bird. I have kept oats 6 years in the sheaf, without injury either to the straw or grain."

David L. White, of Quincy, Florida, writes: "The *white* and *black* varieties both succeed well in this climate. They should be sown in November; the average product is about 12 bushels per acre. This crop is becoming more popular. I prefer cut oats mixed with a little corn-meal to corn and fodder for horses, even in ploughing season."

Mr. Simeon Oliver, of Hernando, Miss., says: "I have grown the *white* and the *ruffled*, but prefer the latter on account of its ripening later (about 1st July), and also for its greater yield. Three bushels of oats are worth two of corn for feed. They are very exhausting to the soil, but the cultivation is increasing as a rotation crop."

Mr. B. W. Hawkins, of Portland, Jay Co., Ind., says: "In this vicinity the *black* oats are preferred; average yield of this variety, 35 bushels per acre, and weight 36 lbs., while other kinds yield less, and rarely weigh over 33 lbs. It is considered a very sure crop, and becoming more popular. Value for feeding, about four-fifths that of corn."

Mr. Perkins, of Burlington, Wis., says: "All varieties of oats succeed well in this climate, and have proved a profitable crop. They are worth from 18 to 25 cents per bushel, and the straw, if well saved, is valuable for wintering young cattle. Compared with corn, oats are considered cheaper food for horses, when cut up and mixed with bran, but dearer if threshed; becoming a more popular crop."

Mr. J. McComb, of Ashland Co., O., writes thus: "I have tried the *large*, and the *small-white* varieties—the latter is most productive; for horses they are better than corn. The crop is becoming less popular, as the market price will not pay for cultivation, unless as a crop to precede wheat. Cost of production, about $3.50 per acre. About half the value of corn for feed."

Mr. E. Clark, of Eaton, Loraine Co., Ohio, writes: "In this vicinity the *English-barley* oat and the common variety are raised. The former lodges badly and shells out in harvesting. Value about one-half that of corn for food, but usually sells for two-thirds the price, and consequently a more profitable crop than corn."

HAY.

"State the comparative value as food for stock, of clover, timothy, and mixed hay—the grass seeds preferred in laying down meadows—the average yield per acre: describe any new process in curing—have meadows been irrigated in your State, and with what effect?" [*Circular.*

Mr. D. D. Marsh, of Croyden, Sullivan Co., N. H., writes as follows:—"The crop of hay this year is scarcely an average one: good lands, well manured, will produce two to three tons per acre; but one ton is as high as the average produce of grass lands throughout this section. In laying down meadows, the seed should be sown thick; a mixture of herds-grass, red-top, and clover is most desirable; as it makes a fine mixed hay, of better quality than either separate. This crop is a very important one, and on land well adapted to its growth, it is very profitable to the farmer: price from $6 to $10 per ton. I have found by experience, that old worn-out grass lands may be made without great expense to produce from two to three tons per acre, by top-dressing with a compost of stable manure and swamp-muck, lime, muriate of soda, (common salt,) and nitrate of soda being used in its preparation. This I have found a highly valuable manure for grass lands, and many other crops."

Mr. Isaac Hubbard, of Claremont, N. H., writes thus: "Hay is our staple crop. Almost every kind of grass is more or less grown. For laying down meadows I use herds-grass, Northern clover, and red-top, mixed. Clover is good for sheep and milch cows, and to turn under as a fertilizer. But one ton of mixed hay is worth one and a half tons of clover for horses, and costs much less to cut. A gang of from 4 to 6 men, with good tools and team, in favorable weather, will cut and secure a ton each per day. Price of labor in haying time, $1.00 to $1.25 per day, with board. Yield of mixed hay, from 1 to 1½ tons to the acre."

Mr. Samuel Wells, of Northampton, Mass., writes as follows: "The business of many of our farmers being the stall-feeding of cattle, great quantities of hay are grown on our alluvial meadows, and it is usually of mixed grass. The most common is timothy or herds-grass, mixed with clover and red-top. A large portion of our meadows where grass is grown is subject to an annual inundation, which leaves a rich deposit on the land. Red-top is considered the best grass, timothy next, and clover is rarely grown without mixture. Meadows, on being laid down to grass, yield the first year 1 to 3 tons, and afterwards 1 to 2 tons per acre. Lately some of our best farmers have sown grass seed among corn at the last hoeing, taking care not to hill up the corn, and have been very successful in that practice."

Mr. Allen W. Dodge writes from Hamilton, Mass., as follows: "In laying down lands to grass, we use of timothy 1 peck, red-top 1 bushel, and a sprinkling of clover. Clover is considered best for milch cows, timothy for horses, and red-top or mixed hay for other stock. Salt or marsh hay is used here in large quantities for cattle. Average produce, about 1 ton per acre."

Mr. L. Smith, President of "Sullivan County (N. Y.) Agricultural Society," writes as follows: "Both clover and timothy are raised in this section, sometimes separately, and sometimes mixed. In the latter case the

large kind of clover is preferred, as it is hardier and grows larger than the common June clover, and also because it ripens at the same time with the timothy. The seed of the *large kind* is worth ¼ to ⅓ more than the small. I believe that the value of clover is generally underrated, compared with timothy; I mean clover of fine growth, cut at the proper stage, and cured in small cocks, without being spread to the sun to dry. From my own experience, I am convinced that, when cured as above, it contains more nutriment than timothy. A few years ago I had an opportunity, without design on my part, to test the relative value of each as feed for cows. I filled a part of my barn with clover hay, and fed seven cows on it all winter. In another part of the barn I kept six cows on the best quality of timothy hay. The cows were all alike, and were fed and tended by the same man. In spring those kept on clover were in so much better condition than the others, that every one who saw them remarked the difference. Clover is also much more valuable as a fertilizer; having long tap roots which penetrate deep into the soil and bring up the fertilizing elements to the surface; and when the roots decay, they form a rich mixture of vegetable matter, which renders the soil light and porous. The roots of the timothy, on the contrary, skim along the surface, and the soil beneath becomes hard, impervious to the air and water, and consequently unproductive."

Mr. J. H. Merreck, of Delaware county, N. Y., says: "I consider timothy most nutritious for cattle; but for all kinds of stock, a mixture of clover and timothy is preferable. The nature of the soil should determine the proportion of each. On wet lands little or no clover should be used; on drier soils the proportion of clover should be increased, until we come to the driest sand and gravel, when little grass of any kind can be relied on. Irrigation, when practicable, is of great value; and often doubles the crop."

Mr. J. M. Nesbit, of Union county, Pa., writes: "Clover is considered best for horned cattle of all ages and descriptions; but for working horses, timothy, or a mixture of timothy and clover, is preferred. The former is principally used in laying down meadows, unless the land is very wet and cannot be easily drained; when thus situated, a portion of red-top seed is frequently sown with the timothy."

Mr. Henry B. Jones, of Brownsburg, Va., writes thus: "Any person can make good hay in fine weather, and the process is very simple. But in showery seasons the work is difficult, and requires good management. Clover hay should never be scattered if the weather is fine, but merely the swarth turned over, and when well wilted it should be put in slim tall cocks for a day or two, and then it should go to the shed or mow, with about 1 gallon of salt sprinkled over each ton. Timothy hay is also best when it can be cured without too much exposure to the sun; but as it turns rain much better than clover, it should season a week or ten days in the cock before being ricked or put in large stacks. It should also be perfectly dry, otherwise it becomes mouldy, and is not relished by any kind of stock. Clover and timothy are often mixed in sowing, but the timothy being later in ripening, I am of opinion that some loss is sustained. I think orchard grass mixed with clover is much better, as both ripen about the same time; and the orchard grass having a stiff straw will keep the clover from falling. I have sown in the spring and fall. Fall sowing is preferred by some, if it can be done early, say from 1st to 15th September. I take 1½ bushels

orchard grass and 4 quarts clover seed, make the seed wet, and then work it over with plaster, lime, or ashes, until it is so dry that the seed will not stick together; it is then fit for sowing, and this quantity of seed will sow one acre. This hay I have found very excellent for milch cows and cattle. As our valley abounds in many places with fine streams of water and good springs, irrigation is generally practicable, and is found to add much to the product of grass lands. The water is taken out as near level as can be, and little gutters are cut from the main ditch, 6, 8, and 10 paces apart, which are again forked so as to throw the water all over the grass. Where the water is plenty, and the hill-side of good breadth, parallel ditches are cut, from which the water is again distributed by gutters so arranged as to spread it as evenly over the ground as possible. Where the meadows are extensive, a hand should be kept constantly employed in changing the direction of the water. The lower part of the meadow should be watered first in the season, while the water is abundant; and as the stream grows weaker, work up to the higher grounds."

Dr. Samuel D. Martin, of Clarke county, Ky., writes as follows: "Clover is extensively sown for increasing the fertility of our worn-out lands, and also as food for stock. Land that has been cultivated many years, until its productiveness has greatly diminished, will be restored in a few years by clover, which at the same time affords nearly as much grazing as any other kind of grass."

Mr. Ralph Ware, of Granville, Putnam county, Ill., writes thus: "Timothy hay is generally preferred, but in seeding we use a mixture of timothy, clover, and red-top. Average yield, 1½ tons per acre. The cultivation of grass is rapidly increasing, as the wild grass cannot be relied upon, for two reasons: 1st, It is very late in spring, and fails early in the fall; 2d, The open prairies are being fenced up to such an extent that it is quite too far for cattle to go daily for pasture and return at night."

Mr. Charles F. Ingalls, Lee Centre, Ill., writes as follows: "Mix timothy and clover for dry soils, timothy and red-top for wet lands. We allow the hay to lie in the swarth until partially cured, and then put it in cocks, when the prairie winds will cure it first rate. Average yield, 1½ tons per acre."

Mr. N. D. Smith writes from Washington, Ark., as follows: "All the varieties of meadow grasses that are so much esteemed in a more northern latitude, have nearly failed here by reason of the long-continued droughts and the heat of our summers. To obtain a grass suited to our wants has long been a desideratum, and I believe from an experience of seven years that it has at last been discovered. This is the *Guinea grass.* It is a native of Africa, and was first imported into the island of Jamaica by the governor, as a bird seed. It was there propagated, and has become a very important article of provender and pasture for every kind of stock, considered only second in value to the sugar cane. It was introduced two years ago into Louisiana, where it is highly valued for soiling and for hay. On rich dry ground it grows to the height of 8 feet, and may be cut 4 feet high four times in a season, yielding two tons per acre at each cutting. I consider it equal to the best cured corn-blades of equal weight. It is best propagated by the roots, which resemble those of the *calamus*—each joint sending up a tuft of blades. The roots extend deep and wide, occupying all the ground as deep as the soil is loosened, and are equal to artichokes as food for hogs. This grass is figured and described in Loudon's Cyclopedia of Agriculture."

DOMESTIC ANIMALS.

"*Horses and Mules.*—Number raised in your State—average value of each—comparative value for farming purposes—where is your market for them?"

"Number of *Horned Cattle* in your State—average value, at 3 years old—where driven to market—cost of keep per head per year—which of the improved races preferred?"

"*Hogs.*—Average weight at a given age—average weight consumed per head—proportion of live to net weight, and cost of production per pound." [*Circular.*

The statements received from our correspondents on the above subjects, are of too vague a character to form the bases of any correct estimates, as to the number of horses, cattle, &c., in the United States. The census of 1850 will furnish much accurate and reliable information on this head, which will be looked for with interest by farmers and others, in all parts of the country.

We give a few extracts, however, principally of a practical character.

Mr. Drisko, of Jonesboro', Me., says: "Not so much attention is given to stock now as was some years since. Enough is raised, however, for domestic purposes, which prevents importation from the western counties to so great an extent as formerly. Five years ago, large droves of working oxen, principally for lumbering, found a market in this county. Considerable numbers are now driven to Brighton, from the central counties of the State, yielding fair profits. Price of working oxen in this vicinity, from $50 to $100 a pair. Cows, $20 to $30 each. Average price of beef, $4.00 per cwt."

Mr. Bradley G. Child, of Bath, N. H., sends us an account of a remarkable cow, raised by him, of the native breed. He says: "In the summer of 1844, she calved about the first of June—during that month, and extending into July, she gave at night-milking 24 quarts of strained milk, and in the morning 18 quarts—making 42 quarts per day from 2 milkings. This cow was of medium size, light brindle color, and was 7 years old. She had no extra feed in summer, but was kept in a good pasture, and in winter had nothing more than the usual foddering of hay. She was farrow the season of 1843, and was accidentally injured early in the year 1845—so that she was ruined as a milker, and was then fattened and killed." Mr. Child still retains the same breed of cows.

Mr. Isaac Hubbard, of Claremont, N. H., writes: "Cattle are extensively raised here—perhaps, nowhere are they better than on the Connecticut river. Average value at 3 years old, $25 to $30. They are usually sold the following summer or fall, and driven to Brighton market. We have the Durhams, Ayrshires, Devons, and several other foreign breeds—of these the Durhams are usually most esteemed. Many of the native cows are good milkers. A cross of the Durham with the native breeds raises good working cattle, perhaps the best for all purposes. The Ayrshires have been lately introduced, and are highly recommended as milkers. The Devons are small, sprightly, and active, make good working-cattle and fine beef. They are preferred by many on account of their color, a bright red.

"At 20 months old, hogs will average 400 lbs. net weight. We can raise

20 cwt. of pork from 5 hogs, as easy as the same weight of beef from 2 oxen."

Mr. Marsh, of Sullivan Co., N. H., says: "The increase in number and value of neat cattle has been very great within a few years—and there is a commendable zeal for the improvement of stock, among our farmers. The native cattle, rough, and often unsaleable, are fast giving away to improved breeds, among which, the Devons are highly esteemed. As working cattle they are unsurpassed, and from their uniformity of color and build, are easily matched. They are active, docile, and tractable, as well as tough and hardy, and will perform much hard labor without losing flesh. As milkers, they are similar to our native cows, but the quality of their milk is always rich. On this point, Mr. Allen, author of 'Domestic Animals,' published in 1848, remarks: 'The cows invariably yield milk of great richness, and when appropriately bred, none surpass them for the quantity of butter and cheese it yields.' The color of the pure Devons is always red. Average value of native cattle, 3 years old, $28—improved breeds, much higher."

Mr. Dean, of Manchester, Vt., says: "The breed of cattle most approved here is the Durham. Value at 3 years old, ranges from $25 to $40. Cost of keeping, the first year, about $5; second year, $7; third year, $9. Brighton is our chief market."

Mr. Allen W. Dodge writes from Hamilton, Mass., as follows: "Average value of 3 year old cattle, $20. None are raised here for sale, but our farmers purchase a great part of their cattle from droves raised in Vermont, New Hampshire, and Maine. There is much difference of opinion as to which of the imported breeds preference should be given. The native breeds are those usually found on our farms. Durhams are better for oxen than for cows. They are large, strong, and quick for draught, but too large for cows. The Ayrshires have a good reputation, but are rarely to be met with; more rarely than the Durhams."

Mr. Aaron Bagg, of West Springfield, Mass., says: "The average weight of hogs, at 18 months old, is about 300 lbs. Difference between live and net weight, 25 per cent. Cost of production, 6 cents per pound. I do not think it profitable for our farmers to make pork at the present high price of corn."

Mr. Thomas, of Wayne Co., N. Y., writes: "Horses are mostly used for farming purposes; mules to a limited extent. But the impression is greatly in favor of the latter, from their hardiness and strength. But few of the best horses are sold in the country, being mostly sent to the Southern and Eastern cities, at an average of about $150 each—average value of farm horses about $80.

"Value of cattle at three years old, from $20 to $30—sometimes, as high as $50. About one-third are slaughtered at home; the remainder are driven to the Southern and Eastern counties to be fattened. The cost of keeping per year is not less than $15. The best selected native stock are usually preferred. Some very fine animals have been obtained by a cross of these with the Durham.

"The production of pork is not generally profitable to farmers. A few, however, who use largely their refuse apples for this purpose, (which they cook with their smallest or unmarketable potatoes and a little corn-meal,) make the raising of hogs quite profitable."

Mr. Samuel Linn, Jun., of Highland county, Ohio, gives the following statement of an experiment made to ascertain the value of corn in fattening

hogs: "A lot of fifty-eight hogs (a mixture of Berkshire and other breeds) were taken for the experiment. Their average age when the fattening commenced was fifteen months, up to which time the cost of raising was as follows:—For the first five months, their food being chiefly corn fed to them and the sows, 10 cents a month per head, making 50 cents: average weight at five months, 60 pounds. This brings them up to the first of November. For the six succeeding months, I found that about three pecks of corn per month to each was necessary to keep them in thriving condition, which, with the labor of feeding, care, &c., was worth 20 cents, making $1.20. For the next four months they were kept on clover, gleanings of stubble, apples, &c., at a cost of 10 cents a month per head, making 40 cents.—Cost of raising up to this time, (September 4th,) when fattening commenced, $2.10 a head. The fifty-eight head now weighed 8120 lbs.; average, 140 lbs. each. Fattening now commenced, and was continued over three months, during which time they consumed 850 bushels of corn, of which 500 bushels were 'hogged down,' as we term it; that is, fenced off in lots, as they needed it, of from one to two acres, and the hogs turned in. Corn on the stalk is worth 15 cents per bushel: an additional cent for labor of fencing makes the 500 bushels worth $80. The 350 bushels fed by hand, with the labor of feeding, worth 20 cents per bushel, amount to $70. Total cost of fattening, $150, or $2.58 per head. Add cost of raising, $2.10, and we have $4.68 as the total cost per head for rearing and fattening. At this time (December 11th) their average weight was 300⅓ lbs.

"From the above we may derive the following answers to your inquiries:

"*Average weight at a given age.*—At five months old, 60 pounds: at eleven months, 100 pounds: at fifteen months, 140 pounds: at eighteen months, when fat, 300 pounds. Average weight of corn consumed per head, 822 pounds.

"*Proportion of live to net weight.*—The prevailing custom here, is to deduct one-fifth. But on a good breed of hogs, fattened as above, repeated experiments have convinced me that this is too much. A hog killed last season weighed alive 242 pounds, and when dressed, 202 pounds; the loss being about one-sixth, which, I think, is about the true estimate.

"*Cost of production.*—From $1.50 to $1.80 per cwt. The average price for fifteen years past, about $3.40."

Mr. Barnett, of Benton, Marshall Co., Ky., writes: "Good milch cows sell here at $8 to $10, and fat beef, on foot, at $2 per cwt. They are mostly shipped to New Orleans. Some improved Durhams have been tried, but with little success. The cross with the Durham preferred to full blood. Our scrub breed of cattle, *having more industry*, do better on our wild grass. Average weight of hogs at eighteen months old, from 150 to 200 pounds. They make their living in the woods, and are frequently killed fat from the mast. Raising hogs is profitable here. Pork is worth $2 to $3 per cwt.; bacon, $4 to $6."

Mr. Geo. McKenney, of Lincoln Co., Ky., says: "The number of horses in the State, in 1848, 361,828; value, $10,743,492. Mules, 37,426; value, $1,318,779. Average value of horses, $29.69; of mules, $35.31. Horses are generally more valuable than mules for farm purposes. From the fact that the soil of Kentucky is very deep, rich, and tenacious, mules are too light: while horses are heavier and stronger, and though more subject to disease, are preferable. Number of cattle in this state, 459,026; value, $1,779,634; average value from three to four years old, $15 to $20;

when fat, $25 to $35; cost of grazing, 40 to 50 cents per head. Short-horn Durhams are generally preferred in this section."

Dr. Samuel D. Martin, of Clarke co., Ky., says: "This State has a great variety of land, and as each breed should be adapted to the soil, no one kind will suit every locality. On the richer lands the improved short-horns are preferred. I sold my three-year-old steers last year for $47 each; this year, for $40 each. They were short-horns, and had been corn-fed one winter. Cost of keeping, about $6 a year when wintered on fodder, and from $15 to $20 when wintered on corn. Hogs are usually killed at eighteen months old; average weight, 300 pounds."

Mr. Henry B. Jones, of Brownsburg, Va., writes as follows: "Pork raised on grass and corn costs here from $4 to $5 per cwt. Eighteen hogs, killed on the 1st of November, each 16 months old, averaged 197 lbs. From another lot of 14 hogs, 4 were taken out, and fed well on shorts, corn, and kitchen slops, and at 11 months averaged 285 lbs. each. The remainder ran out, and were fed twice a day. At the same age, they averaged only 60 lbs. This shows the difference between good and bad keeping. For family bacon, I think hogs of from 160 to 200 lbs. are best, which run out, but are well fed."

Mr. C. Zeringue, of Jefferson Parish, La., says: "Cattle 3 years old are valued here at $7 to $8 per head. They are raised at very little cost, the only trouble being to drive them together once a year, and mark the calves. We then separate those to be sent to New Orleans, our only market. There has been no improvement in the race from the long-horned cattle, originally imported by the Spaniards."

Dr. White, of Quincy, Fla., writes: "Value of cattle 3 years old, about $6. The only expense of keeping is to ride into the range and mark and brand them in spring. But few hogs are raised. We find it cheaper to buy our meat in New Orleans than to raise it, owing to the depredations of the slaves."

Mr. Ralph Ware, of Putnam Co., Illinois, says: "Market for cattle at Chicago; thence many are driven East, or shipped down the lake. We prefer the Durham in this section. Large numbers of horses are raised, and find a ready market at home—average value, $65; but few mules are used. Average weight of hogs, at 18 months old, 250 lbs.; consumed 25 bushels of corn; pork worth from $2.25 to $2.50 per cwt. Much pork raised at a loss to farmers."

Mr. B. W. Hawkins, of Portland, Indiana, says: "There are about 180,000 horses in eastern Indiana; average value, $60; our market in Cincinnati and the Eastern cities. Hogs at 2 years old average 200 lbs.; cost of production, $2.50 per cwt. I am now feeding one on boiled corn, between two and three years old, supposed to weigh 600 lbs."

THE SCIOTO IMPORTATIONS OF IMPROVED CATTLE.

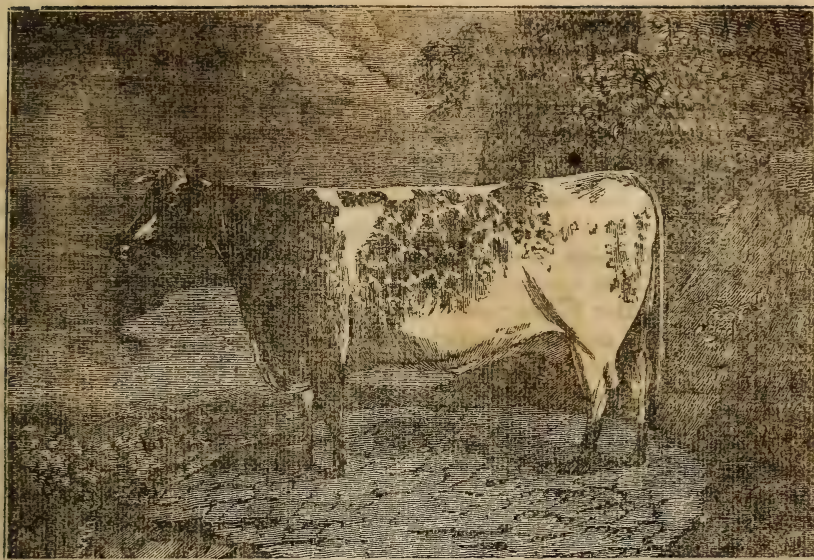
We are indebted to the Hon. J. L. Taylor, of Chillicothe, Ohio, for the following engraving and description of one of the best cows of the short-horn breed ever introduced into this country. The importations of short-horned cattle by the Ohio Company, and others, have effected a rapid improvement in the breeds and quality of the cattle of the Scioto valley,

and great benefit has resulted, from their importation and sales, to that section of the country. Due honor should be awarded to the enterprising capitalists through whose agency these results have been accomplished.

"The Scioto Valley has become somewhat famous for the production of fine stock. From 25,000 to 30,000 head of the best fatted cattle annually driven to the Eastern markets, are taken from this valley, south of the National road. This great business, implicating the value of a million and a quarter of dollars, was commenced by the late Felix Renick, Esq., who was then a recent emigrant from Hardy Co., Va. He and his brother George, in experimenting upon the virgin soils of this luxuriant region, then almost a wilderness, found that immensely large crops of Indian corn could be raised with but little labor, but that there was no remunerating market for large crops of this staple within reach. They devised the project, thus for the first time conceived in this country, of fattening large herds of cattle with their luxuriant crops of maize, and *marching* their grain to distant marts in the shape of fat beef.

"What the trade has become, is known to most of our readers. For a large portion of the year, the Eastern cities as far north as New York, inclusive, are supplied with beef from cattle fattened on the Indian corn of the West and South-West, after the practice commenced in this neighborhood, nearly fifty years ago, by the Messrs. Renick. Nor was the agricultural enterprise of these gentlemen and their compeers confined to this feature of stock improvement. In the year 1833, several of the principal farmers of Ross and two or three adjoining counties, formed an association whose object is sufficiently explained by its title, viz.: 'The Ohio Company for Importing English Cattle.' This society commissioned F. Renick, Esq., as their oldest member and worthy representative, to proceed to England, and, after devoting as much time as he might deem necessary for his purpose, to an examination into the several qualities and descriptions of neat cattle in the best agricultural districts of Britain, to select and purchase, with less regard to cost than to their intrinsic and prospective value, a sufficient number of cows and bulls requisite fairly to introduce their breed into this neighborhood. This mission was highly successful. Mr. Renick was received with great kindness and marked politeness by the principal breeders in the best grazing districts of England, who afforded him every facility for accomplishing his object. He returned, in due time, with some score of animals, of both sexes, of the celebrated Durham short-horn stock, most of which lived and were good breeders. These were held by the various members of the company for a few years, and were then disposed of, at public auction, chiefly to the persons directly interested, at prices greatly above the original cost—so well had public opinion sustained the judgment of the company's agent, Mr. Renick. We recollect that one cow with a young calf was knocked off at the round sum of $2250, to one of the best farmers of Pike county, (who, we are sorry to add, was so unfortunate, soon after, as to lose them both by death.)

"The short-horn stock has become widely disseminated throughout this State, in all the 'grazing' and 'feeding' regions, especially. The *beef qualities* of the species are pre-eminent. Crossed with 'the Patton' or with common stock, good milkers are always the produce; while frequently the thorough-breds yield large quantities of milk. Owing to their rapid procreation, the prices of the short-horns are, of course, much reduced—as was expected and intended—so that the farmer of one hundred, as well as the



SHORT-HORN COW "VIOLET,"

THE PROPERTY OF GEORGE RENICK, ESQ., CHILLICOTHE, OHIO.

owner of a thousand acres, may have his herd. But, the great gain is found in the increased average weight of the fatted cattle driven from this neighborhood, which is not less than 100 lbs. a head above that which prevailed 20 years ago.

"Above is a portrait of one of the best and handsomest cows of the short-horn breed, ever introduced into this neighborhood. Her pedigree is thus noted on page 681 of vol. iii. Coates's Herd Book:—

"'*Violet*, Roan, calved Nov. 30, 1831—Bred by Mr. Smith, of Drax Abbey, the property of Mr. George Renick, Ohio, U. S. America; got by Sheridan, (2616) d. (Fortune) by Regent, (2514) g. d. by Reform, (1361) gr. g. d. (the Old Red Cow) by a Bull of the late Sir George Strickland's, gr. gr. g. d. by Northumberland, (466) gr. gr. gr. g. d. by Mr. Booth's Son of the Twin—brother to Ben, (88.)'

"*Violet* was imported from England, by Mr. George Renick, of Ross County, Ohio, in 1836, and a premium of $50, (in a Silver Pitcher,) was awarded to him, for this Cow, at an exhibition of all the finest stock imported by 'The Ohio Company for Importing English Cattle,' as the best Cow imported by them. The original cost Mr. Renick does not recollect; but he informs us that he could have sold Violet, at one time, for the sum of $3000."—*Scioto Gazette.*

LIME, PLASTER, AND OTHER FERTILIZERS.

The judicious application of manures to land, involving as it does the *feeding* of *plants*, is a matter of the greatest practical importance to the cultivator of the soil. On no subject is there more difference of opinion among farmers, than as to the benefits to be derived from the use of lime as a fertilizer. These opinions are based on individual experience; and so far as that particular locality on which the experiment was made is concerned, the results and inferences derived therefrom are usually correct. For instance, one farmer applies 20 bushels of lime to an acre, and the result is that his crop is nearly doubled. Another man, in the same neighborhood perhaps, makes a similar application, and finds the produce of his field not at all increased. Now the failure in the latter case arose solely from the fact, that the nature of the soil was not understood, and other elements than lime were wanting in its composition. It requires a very close study of the nature of soils, and of the rocks on which they rest, as well as of the elements of the plants to be grown upon them, to enable the intelligent farmer to apply such fertilizers as will best promote the growth of healthy and vigorous crops. These preliminary remarks are necessary to explain the cause of the somewhat conflicting statements which will be found in the following extracts.

Mr. S. Hale, of Keene, N. H., says: "Plaster is used very generally on the Connecticut river meadows in this county with good effect. It is supposed to exhaust the land by increasing the crop. Land thus exhausted can be restored by the use of ashes. In other parts of the county, except in particular localities, it has not been found beneficial. In Keene, which is situated in a valley, once the site of a lake, it has been often tried without benefit. The soil is sandy, formed by the disintegration of the rocks on the surrounding hills. Some of these contain *sulphate of iron*, most of them a greater or less proportion of lime.

"I have used guano twice, as a manure for corn; at each time on an eighth of an acre, at the rate of 300 pounds to the acre. The soil was sandy, light, and dry. The land being ploughed and harrowed, the guano was first pounded, then sifted with a riddle or coarse sieve. It was then intimately mixed, a portion at a time, with five times its own weight of soil, and sown broadcast over the field, which was immediately harrowed, rolled, and planted. At both times rain followed soon after the application. On this part of the field no other manure was used. But on another, adjacent and similar, manure was spread at the rate of fifteen cart-loads to the acre. The crop was better on the piece manured with guano than on the other. I have often used ashes as a fertilizer, and always, no matter what the soil, with good effect."

Mr. Huntoon, of Unity, N. H., says: "Bommer's method is coming much into use here, and I consider it a valuable acquisition. I use bone-dust in preference to plaster. Lime on our soil is not of much value; wood ashes are far better."

Mr. Dean, of Manchester, Vt., writes: "Plaster, ashes, and lime are the best fertilizers for our lands. Plaster is worth $10 per ton; ashes and lime,

16 cents per bushel. Twenty bushels of the latter applied once in 3 years is my method."

Mr. Wells writes from Northampton, Mass.: "Plaster is used here to some extent on warm lands, and would be much more used were it not for the expense, as it costs $9 to $10 per ton. Bone-dust has lately been introduced, and has proved very beneficial, although the quantity as yet used is small. If lime could be had at a price which would justify its use, it would add much to the products of our lands."

Mr. Wm. Lapham, of Mt. Tabor, Champaign Co., Ohio, writes as follows: "We have used plaster and clover as a preparation for wheat, and have found great benefit from them. Our soil is a sandy loam, with a sub-soil of clay, resting on a substratum of gravel. Portions of it have been in cultivation for 20 and 30 years. The plaster is obtained from Lake Erie by railroad, and costs when delivered here four dollars per bbl. of 400 pounds, or one dollar per hundred, ground and ready for use. Our method of using these fertilizers is to sow the plaster at the rate of one bushel per acre on the young clover in the spring. In the second or third year the fall crop of clover is ploughed under, and the wheat sown immediately. The clover is sometimes sown in the spring on the growing wheat, and harrowed in; but we succeed best in sowing the clover with oats. The direct effect of the plaster upon the clover is very great, and the benefit to the succeeding wheat crop is also very apparent. The general influence of plaster and clover has been to permanently increase the fertility of our soils."

Mr. John Kuhn, of Ashland Co., Ohio, says: "The soil here is a heavy clay, and, so far as my experience extends, the application of lime and plaster to this land is money and labor thrown away. But all kinds of animal and vegetable matter, and ashes leached and unleached, are highly beneficial to grains, grasses, and root crops."

Mr. J. M. Nesbit, of Lewisburg, Union Co., Pa., gives the following as the result of his experience on this subject: "During the last few years lime has been used in large quantities in this part of Pennsylvania, and I believe the effect has been uniformly beneficial on all soils. The quantity applied per acre varies from 50 to 100 bushels; depending upon the circumstances of the farmer, the convenience of procuring it, and the nature of the soil. I have not observed, from my own experience, much difference in the immediate effect of the lime, whether applied in large or small quantities; but it is fair to presume, that if the quantity be large, a repetition will not so soon be necessary on the same ground. In 1840 the cost of lime at the kiln was 10 cents per bushel. Now it can be had in any quantity for 6 cents, and in some cases for 5 cents. The cause of the reduction in price is, that formerly wood alone was used as fuel for burning it—now it is burned with the screenings, or waste coal, from the mines; thus greatly economizing the cost of the lime, and also affording a fair price to the miner for that which would otherwise be valueless to him. I should here observe, that since we have commenced the application of lime to our lands we have ceased the use of plaster. After a number of experiments, we are satisfied that the effect of plaster is completely *neutralized* by the lime previously applied to the same soil. How long this result will take place after the lime has been applied to the soil, our experience is of too limited a character to determine; but we have observed the same effect after a lapse of five years. We shall continue our experiments, in order to determine whether it will hereafter become expedient to apply lime and plaster to the same soil; or,

whether the lime will combine with the acid in the soil and form a sufficiency of *sulphate of lime* to obviate the necessity of any direct application of it to the growing crop."

Mr. Morgan, of Kempsville, Va., says: "The opinions in regard to the quantity of lime that can with safety and profit be applied per acre, are various, ranging from 50 to 500 bushels. The judicious application of this great renovator must of course be regulated by the chemical composition of the soil."

Mr. Henry B. Jones, of Brownsburg, writes: "Plaster is very much used in the valley of Virginia. No good farmer will do without it for his clover crop. It is generally used mixed with an equal quantity of ashes. Lime is also beginning to be used, and from 50 to 100 bushels per acre are applied with great success on wheat lands."

Mr. Ruff, of Xenia, Ohio, writes thus of the effects of lime and plaster: "I used plaster the present year for the first time on clover, and find that it has doubled the yield. On corn its action is not so great: nor are its effects so apparent on any other grass as on clover. If it were cheap, it would doubtless add much to the fertility of our soils, and to the agricultural prosperity of this section of the country. I have used lime for a number of years, by way of experiment, in both large and small quantities, and have found it to be entirely worthless—its effects being merely perceptible the first year, and not at all afterwards. The results of experiments in other parts of the State are reported different."

APPLICATION OF LIME.

North Whitehall, Lehigh Co., Pa., *Nov. 22d*, 1849.

Sir:—In your circular of July, 1849, you say—"Whatever may have been tested and found useful and new in practice, together with important agricultural statistics, will be acceptable." If the following will be deemed sufficiently important to be accepted, I shall feel myself happy in having contributed to such an interesting and valuable document as the Patent Office Report.

Twenty-five and thirty years ago, the best and most economical mode of applying lime to arable land as a manure was in a caustic state, fresh from the kiln; but after two or three applications its effect gradually diminished, until of late it has frequently been, the first season after the application was made, more injurious than beneficial.

The reason is obvious: at the first application the soil was full of sour insoluble humus, the soluble having been exhausted by frequent cropping.

Chemistry tells us that caustic lime acts chemically on the humus, by accelerating its decomposition and rendering it soluble, and thus fit to enter the minute fibres of the roots of plants; moreover, it deprives sour humus of its acidity and renders it fertilizing; therefore the richer the soil is in humus, the more sensible is its action: therefore the diminished effect of lime is in proportion to its repeated applications.

An improved soil (if we may call a soil improved which is freed from briers, thistles, and other noxious weeds) requires that lime should be improved as well as other manures before its application, in order that it may partake more of the character of an aliment, instead of a stimulant

as it is in its caustic state. This improvement is effected by throwing the lime into heaps of 20 or 30 bushels, or more, and so leaving it for two, three, or four months, according to season; say in summer for two months, in winter from four to five. By this time the lime is decomposed, and becomes a mild carbonate, and ready to furnish the plants with actual nutritive matter, as well as furnishing a medium through which the roots of plants obtain carbonic acid, which it immediately reabsorbs in equal proportions from the atmosphere.*

In order to show the foregoing not to be a mere hypothesis, I will give the result of actual experiments and observations made by myself.

In the month of August, 1846, I limed a portion of a fallow field, of a thin gravelly soil, resting upon a roofing slate rock, which had been limed several times before at intervals of from five to six years, but no other manure applied. The lime was drawn fresh from the kiln, and deposited in small heaps of half a bushel each, seven paces by eight asunder. The weather was warm, the lime soon became pulverized without the aid of water, and was then immediately spread and harrowed in. Early in the month of September following the whole field was sown with rye. At harvest there was not the least perceptible difference in grain or straw, in the yield of the limed and unlimed portions of the field. In 1848, the same field was again down with rye, but at the last harvest there was a marked difference perceptible, both in grain and straw, in favor of the limed portion of the field.

In the month of June, 1847, I limed an adjoining field of similar soil, and under similar treatment. The lime was deposited in heaps of from 20 to 30 bushels each. In the latter part of August following, the lime was spread at the rate of about 35 bushels per acre and immediately harrowed in, and, in a week or two after, the field was sown with rye, which yielded at the following harvest the heaviest crop the field ever produced.

In the fall of 1848, a neighbor of mine hauled a quantity of lime on a meadow of a dry gravelly soil, in heaps of about 20 or 30 bushels each; last spring the lime was spread, but at what rate per acre, I am unable to say. Judging it, however, at between 50 and 60 bushels per acre, the yield was about one-third more grass than usual. The same neighbor applied lime last season, thus prepared, to his corn crop growing on a limestone soil, and with marked success.

Very respectfully, your obedient servant,

EDWARD KOHLER.

Hon. Thomas Ewbank,

Commissioner of Patents.

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* Our correspondent is wrong in supposing that plants extract carbonic acid from the carbonate of that mineral. The carbonate of lime is dissolved in rain-water more or less charged with carbonic acid, and both the base and acid enter into the circulation of plants.

After slaked lime is spread on a field, it very soon imbibes carbonic acid, and becomes a mild carbonate.

CHARCOAL AND WATER.

About one-half of the dry weight of all plants is *carbon*, or *charcoal*. Of the other moiety, more than four-fifths are water, or, more correctly, the elements of water, called *oxygen* and *hydrogen*. Without the presence of moisture, both in the soil and the atmosphere above it, no plant can grow; and the presence of carbon, in a dissolved or gaseous form, is equally indispensable to the production of all vegetables.

It matters little whether carbon is accumulated in a solid form by imperfect combustion, as in the making of charcoal from wood in a common coal-pit, or by the slow decay of plants (*eremacausis* of Liebig) in forming mould, muck, and peat. The power of these carbonaceous and exceedingly porous bodies to condense the gaseous food of cultivated plants should be universally known. De Saussure found, by direct experiment, that the charcoal formed from box-wood absorbed in 24 hours, and retained within its pores, the following volumes of the several gases named:

	Volume.
Hydrogen	1.75
Nitrogen	7.5
Oxygen	9.25
Carbonic oxide	9.42
Olefiant gas	35.
Carbonic acid gas	35.
Nitrous oxide	40.
Sulphuretted hydrogen	55.
Sulphurous acid	65.
Muriatic acid	85.
Ammoniacal gas	90.

Gaseous compounds of phosphorus obey the same general law, although the table from which we copy the above is defective in not stating the amount. All well pulverized earths have a similar property of condensing oxygen and other gases; and thorough tillage greatly promotes the condensation of vapors and gases about the roots of plants, to nourish them. Charred peat, muck, and wood are exceedingly valuable to mix with all manures to prevent the escape of fertilizing elements which are volatile and liable to rise into the atmosphere. Mr. Phillips gives the following analysis of Irish peat charcoal:

	Combustible.	
Carbon	79.24	
Hydrogen	2.20	
Nitrogen	.54	
Oxygen	6.44	88.42
	Incombustible.	
Clay and silica	2.48	
Oxide of iron	1.66	
Phosphoric acid	.34	
Silicate of potash	.98	
Chloride of sodium	2.53	
Carbonate of lime	1.85	
Sulphate of lime	1.44	
Loss	.30	11.58
		100.00

From the large per cent. of common salt (chloride of sodium) in the ash above described, it is probable that most of the plants which formed the peat grew in salt water, or marsh.

Charred muck, peat, and wood are coming into extensive use in deodorizing night-soil, aided by gypsum and common salt. By these means a fertilizer of great power and perfectly inodorous may be formed, suitable to be planted or drilled with all seeds. Well dried and finely pulverized clay is a valuable deodorizer, and is used by many millions of people in China and some parts of Europe, to mix with night-soil. In this way it can be thoroughly dried and not part with any of its gases. Copperas-water and diluted oil of vitriol poured over night-soil convert all the volatile into involatile elements.

To command water in dry weather, and get rid of the excess in rainy seasons, *deep tillage* is equally valuable. In the former case, moisture *ascends* from the subsoil by capillary attraction; and in the latter, the excess of water in the surface soil *descends* into the subsoil to meet an exigency of an opposite character. The skillful control of water is the first lesson in good farming.

RICE CROP OF SOUTH CAROLINA IN 1849.

We had a very mild winter until the middle of January. For many days in November and December fires were unnecessary. The shattered corn and rice in the fields, where well drained, vegetated and flourished until some time in January. The planting commenced the first week in March. The early rice was just above the ground, the water covering it being drawn in many instances, when we were visited (15th April) by a snow-storm, ushered in by sleet, which checked and suspended all vegetation, injured the young plants, killing many, and producing sad havoc among the trees, then in tender foliage.

On the 18th and 19th of April, frost affected the young rice, retarding its growth some weeks. The months of March and April were dry; May and June less so. During May and June the river (Pedee) was quite full, and the tides continued high throughout, until the 22d June. This prevented the land from draining very well, and in consequence, the early rice did not "grow off after the long water." The tides were very high during all the summer months, on the changes of the moon, and the wind fresh, and sometimes stormy and threatening. This impeded the harvest very much, and doubtless injured some rice. The weather for the most part was reported fine, inasmuch as there was little rain, and almost every day the sun peeped out. In July we had 19 days of rain, and in August, 14. It may have suited the corn very well, but not the rice, which was in blossom about the time of the rains, from 23d July to 15th August.

The crop of rice in 1848 reached 162,058 tierces in market; and of these, 160,330 tierces were exported from South Carolina. The crop of 1849 will probably be short of that, some 15,000 tierces. Still it will be an average crop. The quality of the grain is somewhat better this year than last. Sales of long grain rice have been effected this winter at \$3.50 to \$3.75; and in one or two instances, even \$3.87½ or \$4.00 per cwt.; while the market for ordinary prime ranged from \$2.87½ to \$3.18¾.

Planters are manuring their lands, as well as draining them better than formerly. Some five years ago, our Agricultural Society caused to be made, by Prof. Sheppard, an analysis of rice, the straw, chaff, flour, &c., a copy of which was forwarded by me to the Patent Office. Since that time, the flour, the chaff, and the straw have all been used as manure for rice land, and are deemed among the very best. The flour is best, but is too precious to be used by any but the wealthiest planters, having mills of their own, and not to any great extent even then. The chaff also can only be used by planters having mills of their own. It is spread even, over the surface, about 3 inches deep, and then ploughed in. The straw can be safely used when the field is fallowed. It is then put on the land, thick and bedded in, the more completely to decompose in time for the succeeding crop. This attention, together with improved cultivation, is supposed to have improved the grain, both in size and quality. Rice will keep a very long time in the rough—I believe a life-time. After being cleaned, if it be prime rice, and well milled, it will keep a long time in this climate: only when about to be used, if old, it requires more careful washing to get rid of the must, which accumulates upon it. I sent to Washington by Mr. Sims, two years ago, a specimen of rice prepared by the late venerable Francis Withers, as well as I remember, 18 years before. Some planters, the writer among the number, prefer for table use rice a year old to the new.

This grain is superior to any other provisions in this respect. If a laborer in the *gold-diggings*, or elsewhere, takes with him two days' or a week's provisions in rice, and his wallet happens to get wet, he has only to open it to the sun and air, and he will find it soon dries, and is not at all injured for his purpose. Rough rice may remain under water 24 hours without injury, if dried soon after.

I take leave to send you a few grains of a *second crop* in 1845. Also an ear of the *long-grain*, and *small-grain gold-seed* rice. As something has been said about the wild rice of Minesota, and its superior nutritive qualities, I send you also an ear of the red rice, (considered by us greatly inferior to the two above mentioned,) in order that you may compare the grain with that of the wild rice. This kind takes half as long again to be cleaned.

The samples of rice from Manilla, which we received by the attention of the Department of State, and distributed last year through Mr. Rhett, I am sorry to report did not vegetate. The writer had portions of the six varieties sown in different spots generally favorable; but they all failed. Probably no improvement would have been effected by success in this experiment, as the seed in question was greatly inferior to our own, so much so, that some of my neighbors utterly refused to plant it on their premises.

Rice Crop of 1848.

Plantation.	Barrels shipped.		Barrels of 600 lbs. net.	Net Weight.	Average Net Product per bbl.	Net Income.
	Whole.	Half.				Amount.
1 Prospect Hill	1,387	10	1,495½	897,166	16 $\frac{08}{100}$	$24,060.93
2 Springfield *	737	5	801½	480,937	16 $\frac{60}{100}$	13,264.79
3 Brook Green*	1,571	15	1,716	1,026,405	16 $\frac{58}{100}$	28,260.86
4 Longwood	1,113	4	1,227½	736,413	15 $\frac{59}{100}$	19,021.70
5 Alderly	484	6	583	319,912	16 $\frac{60}{100}$	8,851.23
	5,292	40	5,773½	3,460,833		$93,899.51

* These plantations were sown with *long grain rice;* the remainder with *small grain*, except one, on which the seed was mixed.

These plantations were all on the river Waccamaw. If it be desirable, some examples may be furnished from some other rivers in the rice-growing region. The expenses of a well-supplied rice plantation may be stated at 33⅓ per cent. on net income.

R. F. W. ALLSTON.

Georgetown, S. C., 21*st Jan'ry*, 1850.

COTTON.

Various causes operated to reduce the crop of cotton grown in 1849, below that of 1848. Prominent among these, were severe frosts about the middle of April, in all the cotton-growing states, which destroyed the young plants, and left many planters without seed to repair their losses by planting anew. An excess of rain fell in the months of May, June, and July, which was followed by an unusual drought, soon after, in large districts. The immense quantity of rain that fell did additional damage, by causing rivers to overflow their banks and inundate vast areas of bottom land, to the destruction of cotton and other crops. These disasters were attended by the prevalence of cholera and other diseases of a fatal character, which induced the temporary abandonment of many rich and promising cotton fields. Insects did no inconsiderable injury, as usual, in all the cotton-growing States.

Had it not been for the industry that prompted the planting of more acres than were ever before devoted to this important staple, the supply of this year would be less by some 300,000 bales than it now is.

If the year 1850 shall prove favorable to the growth of cotton, and no serious misfortune befall the cultivators, a harvest of 3,000,000 bags may reasonably be expected. But no crop grown in the United States is more liable to casualties; and not till it is fairly gathered and housed can one feel safe from loss. The receipts up to the latest dates are as follows: (From the Augusta Chronicle and Sentinel of March 6, 1850.)

	1850.	1849.
Savannah, Feb. 26	244,505	237,365
Mobile. Feb. 22	263,302	392,114
New Orleans, Feb. 27	597,147	716,460
Charleston, Feb. 28	263,180	302,493
Florida, Feb. 20	118,128	107,251
Texas, Feb. 20	16,795	16,296
North Carolina, Feb. 16	5,919	2,158
Virginia, Feb. 1	5,275	5,780
	1,514,251	1,779,817

Decrease at New Orleans	119,313	
" " Mobile	128,812	
" " Charleston	39,313	
" " Virginia	505	287,943
Increase at Florida	10,877	
" " Texas	499	
" " Savannah	7,240	
" " North Carolina	3,761	22,377
Total decrease		265,566

Stock on hand.	1849–50.	1848–49.
New Orleans, Feb. 27	229,376	256,643
Mobile, Feb. 22	129,562	167,325
Florida, Feb. 20	48,716	46,548
Texas, Feb. 20	1,750	800
Charleston, Feb. 28	62,950	99,168
Savannah, Feb. 26	62,465	46,879
North Carolina, Feb. 16	550	200
Virginia, Feb. 1	750	650
	536,119	578,213
Decrease in stock		42,101
Stock in New York, Feb. 19	88,952	64,561

Exports.	1849–50.	1847–48.
Great Britain	437,651	673,417
France	148,694	153,731
Other foreign ports	81,417	139,265
Total foreign exports	667,762	966,413
Decrease in foreign exports		298,651
Shipments to Northern ports	473,816	425,814
Increase to the North		48,002

We omit quotations, only remarking that the sales made were about 11½ and 11⅝ for good middling: 11⅞ and 11⅞ for middling fair, and 12¼ and 12½ for fair to fully fair and choice cottons.

We learn that contracts have been made for crops of nankeen cotton at 14 cents, for the next season.

The receipts of cotton at Augusta and Hamburg, up to the 1st of March, reach 208,628 against 226,260 bales last year, showing a deficiency in our receipts of 17,532 bales up to the 1st inst., and a deficiency of receipts in the month of February of 20,019 bales. The shipments so far this season reach 159,820 bales against 196,159 bales last year, and the stock in store 62,527 against 66,654 bales at same date. The total of receipts at the receiving points now reaches 1,514,251 against 1,779,817 bales last year, showing a decrease of 265,566 bales. The falling off is very heavy at Mobile and New Orleans, and the deficiency at other points is also on the increase.

The estimates lately received from New Orleans put down 850,000, and our calculation is, that the Atlantic will not exceed, if it reaches, 700,000 bales.

The foreign exports show a considerable falling off, and the stock in the Southern seaports shows a deficiency of 42,101 bales.

As the crop grown in a year is never all sent to market within any definite time after it is ginned and packed, (some always holding back for better prices,) nothing short of an actual and well-taken census can determine the quantity made in 12 months. The time approaches when some steps will be taken by each State to learn the amount of agricultural products annually called into existence within its limits. As has often been suggested by the writer and others, this can be done with little inconvenience by the assessors or collectors of taxes, in each county or parish, every year.

Every farmer can tell the amount of his last crops: and every one should know all that any dealer or consumer knows about what is annually grown and needed of the articles which he produces. Knowledge of this kind is exceedingly valuable to all classes, but peculiarly so to that great agricultural class who both feed and clothe the world.

Planters and farmers should regard the commercial world as members of one family, the extent of whose wants ought to be studied with nice discrimination, to avoid the errors of producing too much of some necessaries, and too little of others. There is considerable danger that planters will devote too much attention to cotton culture, and too little to growing grain, making meat, and the improvement of lands. The tide never rises so high as not to ebb and leave a wide beach and many a wreck behind.

The cotton grown in one State being often sent to market in another, as from North Carolina and Georgia to Charleston, and from Arkansas, Tennessee, and Mississippi to New Orleans, there are no reliable data to determine the quantity grown in any State. As the United States census will soon be taken, perhaps as early as this report will be printed and distributed, an estimate of the product by States will hardly be worth the expense of publishing in 130,000 copies. The aggregate is likely to be not far from 2,100,000 bales. The average cost of producing 100 lbs. of good cotton is a matter of general interest, and has elicited not a little discussion. Deriving his information from large planters, Mr. Solon Robinson thus estimates the profits and expenses of growing this staple:—

[From the National Intelligencer.]

"What does it cost a pound to grow cotton? This is a question of vast importance to the United States. Who can answer it? Not one in ten of those that make it their staple crop, I venture to say; for cotton planters are as careless in this respect as though they were conducting a business of cents and dimes, instead of dollars and eagles.

I therefore propose to give you an extract from my notes, which I have been taking during my extensive agricultural tour the past winter and spring, not only to show the character of the information that I have been gathering, but in the hope that it may induce others to come out and give more and better information, or point out any errors in my statements.

The cost of making 331,136 pounds of cotton last year upon one of the best plantations of South Carolina was $17,894.48, or a fraction over five

cents and four mills a pound, including freight and commission, as well as interest upon a fair valuation of property.

The cost, exclusive of freight and commission and including interest, of making 128,000 pounds upon the 'cane-brake lands of Alabama' last year was $6,676.80, a fraction over five cents and two mills a pound. This is considered the richest cotton land in the world, and although the crop was called a small one, it was probably about an average one. The field hands upon this place numbered seventy-five, counting all over twelve years old, which gives a fraction less than four and one-third bales to each. Now this crop has to be hauled over about twenty-five miles of the worst roads in the world, when wet, as they usually are at the time the crop is ready to go to market, and then down the difficult and dangerous navigation of the Tombigbee river.

I am satisfied that these two crops give a better showing than three-fourths of the cotton crops of the United States. My own opinion is, that whenever cotton is below six cents it does not pay interest upon the capital invested, except perhaps in some few instances.

Below I give a table of items of expense upon the first plantation mentioned. This is owned by Colonel J. M. Williams, of Society Hill, and lies upon what is called the swamp-lands of the Pedee river. These items are necessary to show that I have not stated the expenses too high.

The capital consists of 4200 acres of land, (2700 in cultivation,) at $15	$63,000.00
254 slaves at $650 each, average old and young	89,900.00
60 mules and mares, and 1 jack, and 1 stud, average $60	3,720.00
200 head of cattle, at $10	2,000.00
500 " hogs, at $2	1,000.00
23 carts and 6 wagons	520.00
60 bull-tongue ploughs, 60 shaving ploughs, 25 turning do., 15 drill do., 15 harrows, at an average of $1.50 each	262.00
All other plantation tools estimated worth	1,000.00
Total	$161,000.00
Cash expenses:	
Interest is only counted on the first five items, $158,620, at 7 per cent	11,103.00
3980 yards Dundee bagging, at 16 cents, (5 yards to a bale,)	636.80
3184 lbs. of rope, at 6 cents	191.04
Taxes on 254 slaves, at 76 cents	193.04
Taxes on land	70.00
Three overseers' wages	900.00
Medical attendance, $1.25 per head	317.00
Bill of yearly supply of iron, average	100.00
Ploughs and other tools purchased, annual average	100.00
200 pairs of shoes, $175; annual supply of hats, $100	275.00
Bill of cotton and woolen cloth	810.00
100 cotton comforters, in lieu of bed blankets	125.00
100 oil-cloth capotes, (New York cost,)	87.50
20 small woolen blankets for infants	25.00
Calico dress and handkerchief for each woman and girl, (extra of other clothing,)	82.00

Christmas presents, given in lieu of "negro crop"	175.00
50 sacks of salt	80.00
Annual average outlay for iron and wood-work for carts and wagons	100.00
Lime and plaster bought last year	194.00
Annual average outlay for gin, bitts, &c	80.00
400 gallons molasses	100.00
3 kegs of tobacco, $60; 2 bbls. of flour, $10	70.00
⅜ of a cent a pound on cotton for freight and commission	2,069.60
	17,879.48

The crop of cotton at six cents will amount to 19,868.16

Colonel Williams has also credited this place with the additional items drawn from it.

13,500 lbs. of bacon taken for home, place, and factory	675.00
Beef and butter for ditto and sales	500.00
1100 bushels of corn and meal for ditto and sales	550.00
80 cords of tan bark for his tan-yard	480.00
Charges to others for blacksmith work	100.00
Mutton and wool for home use and sales	125.00
	$22,298.16

Profits over and above interest and expenses upon this total are $4,403.68.

Counting cotton only at six cents, profits are $1973.68; counting it at seven cents, ($23,179.52,) and profits are $5285.04. It is proper to state that part of the crop was sold at seven cents, and it may average that.

Now it must be borne in mind that this is one of the best plantations, as well in soil as management, and that this was an extraordinary good crop. It must also be assumed that the land will continue to maintain its fertility and value, and that the same hands will keep the building in repair, as no allowance is made in the expense account for such repairs, or there will be a loss under that head.

Most of the corn and meal credited comes from a toll mill on the place. All the cloth and shoes are manufactured by Colonel Williams, but upon a distinct place.

The place mentioned in Alabama belongs to Robert Montague, Esq., of Marengo county.

The items of valuation are:

1100 acres of land, at $25	$27,500.00
120 slaves, at $400	48,000.00
4 wagons	400.00
5 yoke of oxen, at $30	150.00
30 mules and horses, at $75	2,250.00
4000 bushels of corn on hand for plantation use, at 35 cents	1,400.00
Fodder and oats on hand for plantation use	200.00
40 head of cattle, at $5 ......do	200.00
70 head of sheep, at $2 ......do	140.00
250 head of hogs ......do	600.00

20,000 lbs. bacon and pork for plantation use	1,000.00
Ploughs and all other tools.......do	500.00
	$82,240.00

Interest on capital at 7 per cent	5,756.80
Cash expenses, taxes, average	100.00
Blankets, hats, and shoes, (other clothing all home-made,)	250.00
Medical bill, average not exceeding	40.00
500 lbs. of iron, $30; hoes, spades, &c., $30	60.00
Average outlay for mules over what are raised	100.00
Average expense yearly for machinery repairs	20.00
Bagging and rope	350.00
	$6,676.80

This crop (28,000 lbs.) at six cents net will leave a balance of $1004.20, which is just about enough to pay the owner common wages of an overseer, which business he attends to himself.

Now, while there may be a few better places, there are thousands not near as good in all the cotton-growing region.

I am, most respectfully, &c.

SOLON ROBINSON.

WASHINGTON, *June* 4, 1849."

Both of the above estimates are defective and erroneous, but they supply data which will aid in eliciting the truth. No allowance is made in either case for the increase in number and value of the slaves in the course of a year. If this is not equal to 7 per cent. on an average, it is to 3½ per cent., and sometimes reaches 8 or 10 per cent. The calculation is faulty in estimating a great deal more land than is planted, at $15 per acre in one instance, and $25 in the other. The latter price is three times larger than the average of cotton plantations at the South.

Although there are branches of agriculture more profitable than making cotton at six cents a pound, that is not an ill-rewarded business, if skilfully conducted. The way to secure better prices is to be fully prepared to encounter returns smaller than six cents. It is plain that if planters will generally make their own meat, raise their own mules and horses, produce wool enough to pay for all the woolen cloth they need on the plantation, and manage to have a few hundred pounds of butter to sell after supplying their own table, there will be little danger of overstocking the markets with cotton and depressing the price below 8 or 10 cents a pound. On the other hand, while two-thirds of a crop will bring more money than a full one, the sum received for cotton will be nearly so much clear surplus over and above all contingent expenses for the current year. There are three cardinal objects to be pursued in farming or planting:

1st. To make a comfortable and independent living.

2d. To keep the soil one cultivates constantly improving, so that all the crops grown may be produced at less cost.

3d. To lay up property or capital beyond the attainment of the objects above indicated.

It would be easy to write an essay on each of these points; but instead

of this, it is believed that a better service will be done to the cotton-growing interest to copy from the Southern Cultivator, some practical remarks on the preparation of seed and land in cotton culture, from a gentleman of large experience, and well known as a writer on rural topics:—

REMARKS ON THE CULTIVATION OF COTTON.

BY DR. M. W. PHILIPS, OF MISSISSIPPI.

No. 1. *Preparation of Land.*—In writing out the detailed plan I pursue in the cultivation of cotton, I must begin, I suppose, on the 1st of January, so as to carry your readers regularly through. I will endeavor not to be tedious, yet I cannot possibly be minute without at least being tiresome to somebody—as there is always somebody who already knows every thing.

For ten years past I have thrashed down all cotton-stalks, cut down all corn-stalks, and turned them under as well as possible with a turning-plough. When planting cotton after corn, I strive to break up the land with two-horse ploughs—what I term flushing, that is, breaking up 30 to 50 feet beds. Last year I broke up every acre of land I planted with two-horse ploughs, whether planted in cotton, corn, oats, or potatoes.

If any land has been in cotton, I generally open out water-furrows, deep, with a shovel-plough; to this I throw two furrows, one on each side, with one or two-horse turning-ploughs. Thus the land remains until a day or two before I wish to plant, when I have the baulk broken out, thus having fresh earth to plant upon, and yet firm earth for the seed to be planted in. There will be a narrow ridge of earth not covered by the fresh earth, but I invariably run an iron-tooth harrow along the ridge so as to break clods, and rake off pieces of stalk, and to leave the ridge fresh; if once running the harrow will not do, I run it twice.

The opener then follows and opens out a furrow, say one-half inch is deep enough, and narrow; if this furrow could be as straight as a bee line, and half an inch wide, I would esteem it better, if upon level land. The seed is scattered thinly and regularly, then covered with a board or block; I would prefer a roller. As to distance, this depends upon quality, age, and locality of land, rich and fresh land requiring greater distance; and I am inclined to think that the same quality of land north of say 33°, will tend more to longer joints than does cotton about 31° to 33°, and particularly Western lands, these lands tending to short joints, and greater yield to height of cotton. I do not plant any land that requires rows to be over five and a half feet, even to grow 15 to 20 cwt. of cotton per acre. There is sometimes, I am sure, much loss by too sparse planting. I desire to have the plants meet in the rows by the first of August, and should it after this date lap in row, the crop will not be materially injured. I find the new varieties, as sugar-loaf and cluster, to require less distance both ways than does the Mexican. When I planted my crop with Mexican—Petit Gulf—I gave 5 to 5½ feet by 2 to 3 feet on my best land.

For four years I have grown sugar-loaf, and 4½ feet by 18 to 24 inches, preferring about 18 inches. Upon second quality of land I reduce distance to 4 feet less, by 18 inches. Upon this department of planting (the preparation) I use more time and labor than is usual, being careful to break up deep, throw out into beds all the land, leaving no unploughed ridges; the ridges I endeavor to pulverize well, and do not run ploughs unless land will

pulverize, thinking ploughing may be done too early and land injured by being ploughed wet. My object in ploughing, say 3 furrows, early, is to permit the foundation of ridges to settle somewhat, as seed germinates freer and grows off better than upon light earth. I break out the residue as late as planting time, so that the plant will start before or with the grass and weeds. I prefer never more than a bushel of seed per acre, because solitary stalks are not injured by cold weather when scraped out as when grown in a hot-bed.

I have been asked how I plant seed when I buy. I reply I wet the seed thoroughly with salt and water, and sometimes use brine made by steeping stable manure in salt and water for 10 days before wanted, until fermentation has ensued. The seeds are then dried off with ashes, or lime, or plaster; I prefer the two latter, as the seeds are white, and the master can see that care in dropping is practiced by hands. These seeds are dropped at the required distance, and are covered with the foot, by brushing a little earth upon the seeds and pressing them into the earth with the foot. I would prefer a seed-planter, but could not make the one I tried drop regular. Five to ten seeds in a place are ample. I have dropped only one, and two, and three; when I did this myself, I failed not in a stand.

When a good ridge, clean of clods and litter, a hand can scrape more; the labor of planting carefully, and time seemingly lost in this, as well as of dropping seed, is fully regained in the scraping. I have cultivated for ten years 9 to 10 acres of cotton, and 8 to 9 of corn, besides potatoes, oats, &c. This could not have been done, but by doing all work well; time is saved by good ploughing and neat planting.

No. 2. Preparation of Land and Planting.—Last night, I gave you the preparation and planting of the cotton crop; yet I could not, in length of one article, give more than a rapid survey. I prefer short articles, and yet it is best to be particular, even minute, though there is even here an objection, for a writer should leave something for his readers to think of. When I plant oat-land, land that was the year previous at rest, or corn-land, I invariably break up into large beds, size according to width of rows to be planted, so as to throw water-furrow of the flushing as a water-furrow of the row. When four feet rows, I run off land thirty-two feet, and keep furrows as straight as possible on level land. I then lay off rows, always with a shovel-plough, and then two furrows as before. Sometimes I open out the water-furrow of old rows, as deep as two mules can draw a shovel-plough; bed up to this entire, then open out a new water-furrow deep, and reverse two furrows with a one-horse plough. I am satisfied that there is no land I plant but what is materially benefited by breaking up with a two-horse plough; thus all trash, grass, seed, &c., is well buried below the one-horse plough furrow. I use a piece of wood two or three feet long, running level on the land, the front end shod with iron, for the purpose of opening out furrows for planting seed. My object is to make a clean, straight furrow, and impact the loose earth. This stick of wood is rounded below, and fastened to a shovel-plough stock.

The straighter the row on level land, or the more regular on rolling land, if circling be practiced, the closer can the scraper be run, thus giving less labor to hoe hands, and if cotton seed be scattered very regular, so as to give a stand, no stalks touching, the hoe hand can thin out faster, and thus save time. If I were able to plant my cotton crop with the neatness and order with which Col. Wade Hampton plants his crop, I believe I could cul-

tivate an acre or two more per hand. Being in company with him in 1847, on a steamboat, we discussed the subject of planting for hours, and he assured me that all his furrows were opened out for planting with the corner of the hoe, narrow and straight. If I could drop seed in a furrow only an inch wide and quite straight, I think I could manage two acres of scraping per day to each full hand; I regard planting a crop, if done in the best manner, more in the light of half cultivated, than many would believe. I have scraped three acres in a day. I can dirt easily four acres per horse, and can with the solid sweeps break out four to nine acres per horse, owing to whether rows be four or five feet wide; thus, besides the earthing furrow, it requires one or two to sweep out the middle. But land has to be put in good order, and seed planted in order. This matter has called for many a line from my pen in the different papers I have written for, and I must be pardoned for thus dwelling so long. It is really no interest of mine whether planters cultivate well or ill; whether they can cultivate a fair crop easily or not, I cannot be benefited; yet as a citizen of this beautiful world, as a sojourner in this southern clime, I feel an abiding interest in the welfare of my fellows. Therefore, I say, if planters will devote more care and attention in tilling their lands, and in putting in their crops in a good manner, they will be able to make more, and yet spare their servants and their beasts much labor in the cultivation.

Look at the garden. Take one bed and trench it, spade up two spades deep, reversing the soil even, what will be the result? But suppose the first spit be laid one side, then the second spit well and finely dug up, the first returned reversed, or thoroughly mixed, will not that bed be more or less moist all the year? And if there is any chance for water to pass off, will it not be fit to work, after a rain, sooner than any part of the garden? and must it not, of necessity, produce better?

I admit a planter cannot plant so great a crop, but he will need much less to make an equal crop.

The misfortune is, the body of cotton planters want a large crop, and will not be at the expense of team and tools. Would they not ridicule the carpenter, who, instead of getting tools to tongue and groove his flooring, would attempt to rabbet each side of plank, or to dig grooves, and then dig for a tongue with a chisel? And yet, though not quite so absurd, planters so act. What difference in cost in twenty years, if a planter buys six shovels, six one-horse turning-ploughs, three two-horse turning-ploughs, six scrapers, six harrows, or to buy all turn-ploughs? These same ploughs will last by changing, those not used to be taken care of, as long as the same number of one kind, and for all work. "Think ye, and judge ye."

Mr. Simeon Oliver, of Hernando, Miss., writes us that the average yield of seed cotton is 1000 lbs per acre in that county, and the cost of production about 6 cents a pound. The *sugar-loaf cluster*, or Prout variety, yields best.

Mr. E. A. Holt, of Montgomery, (good authority,) estimates the crop of Alabama for 1849 at 400,000 bales. The Mexican or Petit Gulf is regarded as the best variety.

Dr. David L. White, of Florida, writes, that the average yield per acre there is 800 lbs., and per hand from 3 to 4 bales. Petit Gulf is preferred; of the upland class of plants, seed of long staple obtained from South Carolina.

From St. Francis Co., Arkansas, as Mr. J. W. Calvert writes, they gather

about 1000 lbs. of seed cotton from an acre, in some instances much more. Varieties grown, Mastodon, Mexican, &c. He prefers Mastodon for their land, and Mexican for rich soils. No manure except cotton seed is used.

In south-western Texas, cotton crops are quite uncertain and irregular. Mr. Pryor Lea writes, that the worm does great injury; but aside from these casualties, a bale of cotton per acre and ten per hand are a common return.

In the north of Alabama, as Mr. James Williams, of Jackson Co., informs us, the crop is very light. He regards cotton at 6 cents a pound as a better crop than corn or wheat.

Mr. Thomas A. Heard, of Clark Co., Ark., estimates the cost of growing a bag of cotton at $25, where, he says, the average is 1200 lbs. per acre; some lands go as high as 2500 lbs., which would turn out nearly two bales, or 800 lbs.

Mr. Samuel S. Graham, of Coosa Co., Alabama, says that cotton will grow on land too poor for wheat. He estimates the crop of the State at 450,000 bales of 500 lbs. each. Cost of production, five cents a pound; average yield, 150 lbs. of clean cotton per acre.

Lands cultivated in cotton are extremely liable to injury by washing rains. The warmer a climate, the more water the air will hold in the form of an invisible vapor, or of clouds, and the more sudden and voluminous the fall of showers. A large portion of the water thus precipitated upon the mellow soil runs off, and carries with it, even where it forms no gulleys, much of the fine particles of mould, loam, and clay. In this connection, it is important to bear in mind that it is the smallest fragments of rocks and decaying plants and insects, which dissolve in water and enter the roots of cultivated vegetables to nourish them. Hence, the organic and inorganic matter borne along in a muddy stream (and all streams that flow over ploughed ground are muddy) robs the soil of its fertility vastly more than would the removal of an equal weight of coarse sand, gravel, or compact clay. One valuable means of preventing the wash of hoed fields is to seed them in autumn as early as practicable, with some small grain, such as rye, barley, wheat, or oats. These plants will not only serve to prevent the washing of the ground, but they will imbibe volatile and involatile food from the soil, which would be lost without their presence. In addition to this, the winters are warm enough at the South for small grains to grow and draw largely upon the atmosphere for their organic elements. These crops, consumed by sheep or other animals, will yield valuable meat and not a little equally valuable manure. So soon as cotton and corn cease to grow, and peas are ripe when planted in cornfields, rye or some winter grain should be sown for the benefit of the land. The winter is the time to renovate the soil at the South. Particular pains should be taken in saving cotton seed, and the droppings from all domestic animals in stables and yards. Manure has been found in so cold a climate as that of Scotland to lose three-fourths of its fertilizing power in a few months, if permitted to lie out in an open yard and exposed to rains and sunshine.

ANALYSIS OF COTTON SEED AND WOOL.

BY PROF. W. SHEPPARD, OF S. C.

One hundred parts of cotton wool, on being heated in a platina crucible, lost 85.89 parts. The residuum, on being ignited under a muffle till the whole of the carbon was consumed, lost 12.735, and left a white ash which weighed nearly 1 per cent., or 0.9347. Of this ash, nearly 44 per cent. was soluble in water. Its constituents were as follows:

Carbonate of potash, (with a trace of soda,)	44.29
Phosphate of lime, (with a trace of magnesia,)	25.34
Carbonate of lime	8.97
Carbonate of magnesia	6.75
Silica	4.12
Sulphate of potassa	2.90
Alumina	1.40
Chloride of potassium, Sulphate of lime, Phosphate of potassa, Oxide of iron, (a trace,) and loss	6.23
	100.00

Analysis of Cotton Seed.—One hundred parts, treated as before, lost 77.387, and the residuum, after being burnt under a muffle, left 3.986 parts of a perfectly white ash, the composition of which was as follows:

Phosphate of lime, (with traces of magnesia,)	61.34
Phosphate of potassa, (with traces of soda,)	31.74
Sulphate of potassa	2.65
Silica	1.68
Carbonate of lime	47
Carbonate of magnesia	27
Chloride of potassium	25
Carbonate of potassa, Sulphate of lime, Sulphate of magnesia, Alumina and oxide of iron, and loss	1.68
	100.00

PRIZE ESSAY ON THE CULTURE AND MANAGEMENT OF TOBACCO.

BY W. W. W. BOWIE, ESQ., OF PRINCE GEORGE'S CO., MD.

[The Publisher of the AMERICAN FARMER having offered a piece of silver plate of the value of $30 for the best Essay on the above subject, the Committee, consisting of Messrs. H. G. S. KEY, J. S. SELLMAN, GEO. W. HUGHES, JOHN D. BOWLING, and W. C. CALVERT, of Maryland, awarded the prize for the following Essay.]

A RICH loam is the soil for tobacco plants. The spot selected for a bed should be the south side of a gentle elevation, as well protected as possible by woods or shrubbery—a warm spot—mellow ground, perfectly pulverized. After a thorough burning of brush and tobacco stalks mixed, dig deep, and continue to dig, rake, and chop, until every clod, root, and stone be removed; then level and pulverize nicely with the rake. Mix one gill of seed for every ten square yards, with a quart or half gallon of plaster or sifted ashes to every half pint of seed, and sow it regularly, in the same manner that gardeners sow small seeds, only with a heavier hand. Roll with a hand-roller or tramp it with the feet. If the bed be sown early, it ought to be covered with brush free from leaves; but it is not necessary to cover them after the middle of March. Tobacco beds may be sown at any time during winter if the ground be not too wet or frozen. The *best* time for sowing is from the 10th to the 20th of March, although it is safest to sow at intervals, whenever the land is in fine order for working. Never sow unless the land be in good order, for the work will be thrown away if the land be too moist, or be not perfectly prepared. The beds must be kept free from grass or weeds, until they are no longer needed, and the grass must be picked out a sprig at a time by the fingers. It is a tedious and troublesome operation, therefore planters should be very careful not to use any manures on their beds which have grass seeds or weeds in them. After the plants are up they should receive a slight top-dressing of manure once a week, sown broadcast by the hand. This manure should be composed of half a bushel of unleached ashes, (or 1 bushel of burnt turf,) 1 bushel of fresh virgin woods earth, 1 gallon of plaster, half a gallon of soot, 1 quart of salt dissolved in 2 gallons of liquid from barn-yard, and 4 lbs. of pulverized sulphur, the whole well intermixed. Let a large quantity be got together early in the winter and put away in barrels for use when wanted. This and other such mixtures have been found efficacious in arresting the ravages of the fly,—both from the frequent dusting of the plants and the increased vigor which it imparts to them, thereby enabling the plant the sooner to get out of that tender state in which the fly is most destructive to it. The fly is a small black insect, somewhat like the flea, and delights in cold, dry, harsh weather, but disappearing with the mild showers and hot suns of opening summer. If possible, the plants should stand in the bed from half an inch to an inch apart, and if they are too thick they must be raked when they have generally become as large as a five or ten cent piece. The rake proper for the purpose should be a small common rake with iron teeth, 3 inches long, curved at the points; teeth flat, and three-eighths of an inch wide, and set half an inch apart.

After-culture, &c.—The soil best adapted to the growth of tobacco is a light friable soil, or what is commonly called a sandy loam, not too flat, but rolling undulating land—not liable to drown in excessive rains. New land is far better than old. Ashes are decidedly superior to any other fertilizer

for tobacco. Theory and practice unite in sustaining this assertion. The land intended for tobacco should be well ploughed in April, taking care to turn the turf completely under, and subsoiling any portions that may be very stiff and likely to hold water near the surface, and let the land be well harrowed directly after the breaking it up; it should then be kept clean, light, and well pulverized by occasional working with cultivators and large harrows so as not to disturb the turf beneath the surface. When the plants are of good size for transplanting, and the ground in good order for their reception, the land, or so much as can be planted in a "*season*," should be "*scraped*," which is done by running parallel furrows with a small seeding plough, (the Davis or Woods plough for instance,) two and a half feet apart, and then crossing these again at right angles, preserving the same distance, which leaves the ground divided in checks or squares of two and a half or three feet each. The hoes are then put to work and the hill is formed by drawing the two front angles of the square into the hollow or middle, and then smoothed on top and *patted* by one blow of the hoe. The furrows should be run shallow, for the hills should be low and well levelled off on the top, and, if possible, a slight depression near the centre, so as to collect the water near the plant. The first fine rain thereafter, the plants should be removed from the seed beds, and one carefully planted in each hill. A brisk man can plant 10,000 plants per day. The smaller or weaker hands, with baskets filled with plants, precede the *planters* and *drop* the plants on the hill. In drawing the plants from the bed, and in carrying them to the ground, great care should be taken not to bruise or mash them. They ought to be put in baskets or in barrels, if removed in carts, so that not many will be in a heap together. The plants should never be planted deeper than when they stood in the bed.

Planting is done by seizing the plants dropt on the hill with the left hand, while with one finger of the right hand a hole is made in the centre of the hill, and the root of the plant put in with the left, while the dirt is well closed about the roots by pressing the forefinger and thumb of the right hand on each side of the plant, taking care to close the earth well about the bottom of the root. If sticks are used to plant with, they should be short, and the planter should be particular not to make the holes too deep. The plants should be very carefully planted, for if the roots are put in crooked and bent up, the plant may live, but will never flourish, and perhaps, when too late to *replant*, it will die, and then all the labor will be of no avail. In three or four days it may be weeded out, that is, the hoes are passed near the plants, and the hard crust formed on the hills pulled away, and the edges of the hill pulled down in the furrows; this is easily done if performed soon after planting, but if delayed, and the ground gets grassy, it will then be found a very troublesome operation. After "*weeding*" out, put a tablespoonful, or a gill if it be preferred, of equal parts of plaster and ashes well mixed, upon each plant. In a few days, say a week or less time, run a small plough through it, going twice in a row. This is a delicate operation and requires a steady horse and a skillful ploughman, for without great care the plants will be knocked up or be killed by the working. In a week after the *tobacco cultivator* or *shovel* must be used. These implements are well made by R. Sinclair, Jr. & Co., of Baltimore. Either implement is valuable at this stage of the crop. But once in a row is often enough for either cultivator or shovel to pass. The crop can now be made with their use by working the tobacco once a week or ten days, for four or five

weeks, going each time across the former working. Any grass growing near the root of the plants should be pulled out by hand. As soon as the tobacco has become too large to work without injuring the leaves by the swingle-tree, the hoes should pass through it, drawing a little earth to the plants when required, and level the furrows caused by the cultivator, and shovel. Let this hoeing be well done, and the crop wants no more working. Care should be taken to leave the land as level as possible, for level culture is most generally best. When it blossoms, the best plants ought to be selected for seed; one hundred plants being enough to save for seed to sow a crop of 40,000 pounds. All the rest should be "*topt*" before they blossom—indeed, as soon as the blossom is fairly formed. It should be *topt* down to the leaves that are six inches long, if early in the season, but if late, top still lower. If the season be favorable, in two weeks after a plant has been "*topt*" it will be fit for "*cutting*," yet it will not suffer by standing longer in the field. From this stage of the crop until it is in the house, it is a source of great solicitude and vexation to the planter. He is fearful of storms, of frost, and *worms*, his worst enemy—they come in crowds—"their name is Legion"—and the "*suckers*" are to be pulled off, and the "*ground leaves*" are to be saved. The "*suckers*" ought to be pulled off when they get three or four inches long; they spring out abundantly from each leaf where it joins the stalk. "*Ground leaves*" are those leaves at the bottom of the plant which become dry on the stalk, and ought to be gathered early in the morning when they will not crumble.

The worms ought to be pulled off and killed as fast as they appear, or they will soon destroy the crop. Turkeys are of great assistance in destroying these insects; they eat them and kill thousands which they do not eat, for it seems to be a cherished amusement of the turkey to kill worms on tobacco—they grow passionately fond of it—they kill for the love of killing. There are every year two "*gluts*," as they are called by planters; the first attacking the plants about the time that they are one-third or half grown, the other comes on when the tobacco is ready for cutting. The first can easily be subdued with a good supply of turkeys, and if *then* they are effectually destroyed, the second *glut* will be very easy to manage, for it is the opinion of many intelligent and experienced planters that the greater portion of the first *glut* reappear the same year as *Horn-blowers* and breed myriads. When the second army of worms makes its appearance, the tobacco is generally so large that turkeys do but little good. The only method then to destroy them is to begin in time, start when they are being hatched, and keep up a strict watch upon them, going over the whole field, plant by plant, and breaking the eggs—killing such as may be seen, and by constant attention during each morning and evening to this business alone, with the whole force of the farm, they may be prevented from doing much harm. When they disappear the second time, there is no more cause of trouble. For a full entomological description of the tobacco worm, and the easiest and most effectual method of rendering them comparatively harmless, I beg leave to refer the reader to a letter written to J. S. Skinner, Esq., by the author of this essay, and published in the Farmers' Library in 1848. When the plant begins to yellow, it is time to put it away. It is cut off close to the ground by turning up the bottom leaves and striking with a tobacco knife, formed of an old scythe—such knives as often are used for cutting corn. Let it lay on the ground for a short time to "*fall*" or wilt, and then carry it to the tobacco house, when it may be

put away in three different modes, by "*pegging*," "*spearing*," and "*splitting*." "*Pegging*" tobacco is the neatest and best mode, yet the slowest. It is done by driving little pegs, about six inches long and half an inch or less square, into the stalk about four inches from the big end of the stalk; and these pegs are driven in with a mallet, in a slanting direction, so as to hook on the sticks in the house. It is then put on a "*horse*," which, by a rope fixed to one corner, is pulled up in the house, and there hung upon the sticks, which are regulated at proper distances. A "tobacco horse" is nothing more than three small sticks nailed together so as to form a triangle, each side being three or four feet long. Spearing is the plan I pursue, because it is neat enough and decidedly the quickest plan. A rough block with a hole morticed in it, and a little fork a few inches from the hole for the tobacco stick to rest upon, one end being in the hole, with a spear on the other end of the stick, is all the apparatus required. The plant is then with both hands run over the spear, and thus strung upon the stick, which when full is taken to the house and hung up at once. There are "*dart-spears*," like the Indian dart in form, and "*round-spears*;" either, however, will answer.

"*Splitting*" tobacco is admired by many who contend that it cures brighter, certainly quicker, and less likely to *house-burn* or injure from too thick hanging. This mode is pursued easily by simply splitting, with a knife made for the purpose, the plant from the top to within a few inches of the bottom, before it is cut down for housing. Care should be taken not to break the leaves while splitting the stalk. The knife for splitting may be fully described by saying it is a miniature spade. It can be easily made out of an old scythe blade, inserted in a cleft white oak handle with its edges bevelled off to the blade, so that it acts as a wedge to the descending knife. After the tobacco is split, cut down, and carried to the house, it is straddled across the sticks and hung up. The sticks are generally supported by forks driven in the ground near the heap of tobacco, for greater convenience to the person putting on the plants.

Tobacco sticks are small round sticks, or are split out like laths, and are about one inch square, or one and a half inches square, usually larger at one end than the other, and they should be eight or ten inches longer than the joists of the tobacco house are wide apart. If the tobacco is of good size, six or seven plants are enough on a four-foot stick. When first hung up, the sticks should be a foot or fifteen inches apart. As the tobacco cures they may be pushed up closer. After a house is filled, some planters put large fires under it, as soon as it has turned yellow, and by hot fires it is dried at once and does not change color, unless to increase its brightness; but "*firing*" gives a smoke, smell, and taste that is therefore not much liked by buyers. The cost of labor and loss of wood, and the risk of losing tobacco, and the house too, are great objections well urged against *firing*. The better plan is to have sufficient house-room and hang it thin in houses not too large, which have windows and doors so as to admit light and dry air, and by closing them in bad weather, exclude the rain and dampness, which materially damage the tobacco, besides injuring the color of it. After becoming dry and well cured, the stem of the leaf being free from sap, the first mild damp spell of weather it will become soft and pliant, and then be stript off the stalk. It is first pulled or taken off the sticks and put in piles, then the leaves are stript off and tied in bundles of about one-fifth or sixth of a lb. in each. The bundle is formed by wrapping a leaf around

the upper part of the handful of leaves, for about four inches, and tucking the end in the middle of the bundle, by way of confining it. There ought, if the quality of the crop will permit, to be four sorts of tobacco, "*Yellow*," "*Bright*," "*Dull*," and "*Second*." When the tobacco is taken down, the "*cullers*" take each plant and pull off the defective and trashy ground and worm-eaten leaves that are next to the big end of the stalk, and then throw the plant to the next person, who strips off all the *bright* leaves, (and if there be any yellow leaves, he lays *them* on one side until he has got enough to make a bundle,) and throws the plant to the next, who takes off all the rest, being the "*dull*;" and the respective strippers, as they get enough leaves in hand, tie up the bundles and throw them separate for convenience in bulking. Stripping should never be done in drying, or harsh weather, unless the tobacco is bulked up almost as fast as it is stript. The best plan is not to take down more than you can conveniently tie up in a few hours; but if the planter chooses he may take down a large quantity and put it in bulk, stalks and all, cover it with tobacco sticks, and it will keep many days, so that, no matter how the weather be, he can strip out of the bulk. However, this is a very bad, wasteful way. Tobacco should not be too moist, or "*high*" as it is termed, when put in the stalk-bulks, or it will get warm, the leaves stick to the stalk, get a bad smell, and change color; besides, if left too long it will rot. To "*bulk*" tobacco requires judgment and neatness. Two logs should be laid parallel to each other about thirty inches apart, and the space between them filled with sticks, for the purpose of keeping the tobacco from the dampness of the ground. The bundles are then taken one at a time, spread out and smoothed down, which is most conveniently done by putting it against the breast and stroking the leaves downward smooth and straight with the right hand. It is then passed two bundles at a time to the man bulking. He takes them, lays them down and presses them with his hands; they are laid two at a time in a straight line—the broad part of the bundles slightly projecting over the next two, and two rows of bundles are put in a bulk, both rows carried on together, the heads being on the outside and the tails just lapping one over the other in regular succession. The *bulk*, when carried up to a convenient height, should have a few sticks laid on the top to keep it in place. It must often be examined, and if getting warm, it ought to be immediately changed and laid down in another bulk, of less height, and not pressed as it is laid down; this is called "*wind-rowing*;" being loose and open, it admits the air between the rows of bundles, hence the term. The next process in this troublesome but beautiful crop is to "*condition*" it for "*packing*." The *bright*, *yellow*, and *second* tobacco will condition best most generally in such bulks as I have just described, but it is best to hang up the *dull* as soon almost as stript. If the bright or seconds do not dry thoroughly in the bulks, that should also be hung up in the house to become well dried. To properly hang up tobacco to condition, small-sized sticks should be procured, and each one nicely smoothed with the drawing-knife and kept for that purpose. After it has once been perfectly dry either hanging up or in bulks—so dry that the heads are easily knocked off and the *shoulders* of the bundles crack upon pressure like pipe-stems—it should be taken down, or, if in bulks, removed the first soft giving spell of weather, as soon as it is soft and yielding enough, as it will become, to handle without crumbling or breaking, and it must be put in four, six, or eight row bulks of any convenient length and height, the higher the better—laid down close so that as

little of the leaves or shoulders as possible shall be exposed on the outside of the bulks. When completed, put sticks and logs of wood, &c. &c. on the top, so as to weigh it down. Here it will keep sweet and in nice order for packing at any time, no matter what the weather may be; if it was conditioned properly, it will not change a particle while in the *condition bulk.* Mild, soft, pleasant weather is the best to pack tobacco in. The best tobacco prize is one known as "Page's Prize," but was first invented by the Rev. Mr. Aisquith, and improved afterwards by Page, at the suggestions of practical planters. It is very cheap, expeditious in its working, and being easily taken down and put up, may with convenience be moved from house to house.

As to the size of the hogsheads, the best size is the ultimatum of the law, forty inches in the head and fifty-two in the length. Almost any wood will answer to saw into hogshead stuff, the best, of course, is that which is strong but weighs light, such as gum or beach, or birch or poplar. No hogshead ought to weigh over 100 lbs. and staves drawn out of red oak, or other oaks, which make the best hogsheads, but are too costly, ought not to weigh over 90 lbs.

Having now got our tobacco in good order, our prize and hogsheads ready, the first mild day that we can spare, we proceed to *packing.* Let me here observe that while putting the tobacco in condition bulk, all the bundles that were *soft,* or had an ill smell, ought to have been laid aside to be made sweet and dry, by a few hours' exposure to the sun. The same precaution *must* be observed while packing. In putting the tobacco in the hogshead for packing, a man gets inside, *shoes off,* and lays one bundle at a time in a circle, beginning in the middle, and each circle is extended until the outer circle touches the staves of the hogshead; a single row of bundles is then laid all round the edge on the heads of the last circle, then across the hogshead in parallel rows, the middle being always raised a little higher than the outer edge. This is called a *course,* and these *courses* are continued until the hogshead be filled. The man who is packing presses with his knees each bundle, in each course, as he lays it, and often stands upon his feet and tramps heavily but cautiously, all round and across, so as to get in as much as possible. One receiving hogshead and two false hogsheads five feet long, making fourteen feet four inches of tobacco, will weigh from nine hundred to one thousand pounds if well hand-packed, and in fine order. This concludes the almost ceaseless round of labor that is necessary to prepare for market this important staple of our country. It will be seen that I have endeavored to be as explicit and plain as possible, and have studied the greatest simplicity of style, supposing that to be the most suitable to the subject under consideration.

Planters in Maryland should grow less tobacco, and thereby improve its condition and quality. By that means they would require less house-room, fewer hands, less land, and receive more money for what was made. It is no uncommon occurrence for planters to fall short say 15 or 20,000 pounds in a large crop, yet receive more money for the residue than they got for the additional 20,000 lbs. the year before. The reason is, that *not being* pressed for room, it cured better, and they managed it better throughout its various stages, and consequently got a greatly increased price for it. That too is one reason why small crops invariably out-sell large crops, by several dollars per 100 lbs.; the other reason is, that small crops are rarely subject to drafts that must be met even if it be by forced sales. As a striking

instance of the uselessness of pursuing a practice of *overcropping*, which too many of the largest planters are constantly following to their great loss from year to year, and to the detriment of their neighbors by glutting the market with *trash*, I will mention a circumstance which made an impression on me the past year. Two gentlemen had each very fine crops of tobacco, so equal in appearance that there might be said to have been no difference in the product per acre as it stood, just when fit to top; but one had 220,000 hills, a small force in proportion to his crop, and scarce of room, having to haul some of it two miles to a neighbor's house. The other had only 160,000, plenty of room convenient to the tobacco ground, and a large number of hands to manage it. The latter gentleman made several thousand pounds more than the first, and it will average a larger sum per 100 lbs. taking the crop through. The reason is obvious, for in this crop every leaf was saved, none lost by worms, nor by "*house-burning*," (that is suffering, or even *rotting* from being hung too thick,) nor loss by distant transportation; nor by that unavoidable waste which is the sure accompaniment to hurry and over-work in the securing of any crop. To all these disadvantages and losses the other crop was subjected.

One word more, by way of advice to the planters, will not I hope be considered out of place here. *Never draw a draft upon the tobacco which you consign to your commission merchant.* Fix a value upon it yourselves, and refuse to take less for it than you think it worth, unless you are necessitated to sell, and then sell before it be known that you are compelled to sell. The chief rule of the *buyers* of tobacco is, I believe, in fixing the *price*, not founded upon the European demand, but the demands of the planters upon their merchants through the banks; and by that means the buyers are constantly kept advised of the necessities of the planters as individuals as well as a community, and they reduce the price of the article according to the urgency of the wants of the planters. I think it would be advisable, at least a safe *experiment*, for a sufficient number of the largest planters to establish an agency in some European market, and charter a vessel annually to take out their crops. The agent should be a practical planter, and be also an American citizen. His agency should cease at the farthest in five years, lest he become contaminated, and commence speculation on his own hook, as is too often the case with our commission merchants, who both buy for the *consumer* and sell for the *producer*, yet maintain their integrity, although no doubt it is sometimes inconvenient to the *conscientious*, who perhaps find it a stumbling-block in their religious pathway.

I conclude with expressing the hope that this humble essay may be favorably received by the planters of Maryland; and should any of the suggestions it contains be found of value hereafter to any individual, the highest gratification will be experienced by the author; and he will feel himself amply compensated for his labor and trouble, by the delightful reflection that he had contributed a small share to the advancement of the great planting interest, and thereby been of some use to his countrymen. [*American Farmer.*]

NICOTIANA TABACUM.

THE following are the results of a series of experiments made by Messrs. Cooper and Brande, for the purpose of ascertaining the quantity of soluble matter in eight samples of tobacco, of detecting the presence and quantity of sugar contained in them, and the nature and relative proportions of their inorganic constituents. An important paper on the state in which *Nicotina* exists in tobacco, and on the relative proportion of it furnished by different varieties of the plant, has been furnished by Schlœssing, (Am. ch. et Ph. 3ieme Sér. XIX. 230.)

Tobacco dried at 212°.	Per cent. of extract, &c. soluble in water.	Per cent. of woody fibre, &c. insoluble in water.	Per cent. of ash after treatment with carbonate of ammonia.	Per cent. of matter soluble in water in the ash.	Per cent. of matter soluble in hydrochloric acid in the ash.	Per cent. of insoluble matter, as silica, &c. in the ash.	Per cent. of alcohol obtained from fermented infusion.	Per cent. of saccharine matter deduced from the obtained alcohol.
1. Light Missouri leaf and stalk	49	54.9	20.97 white	2.17	11.73	5.9		
2. Light Missouri leaf only	50	47.7	19.7 white	1.77	12.83	5.1	0.75	1.50
3. Dark Missouri leaf and stalk	50	52.4	16.47 white	4.2	10.14	2.13		
4. Dark Missouri leaf only	51	50.6	13.8 white	2.17	8.73	2.9	0.35	0.71
5. Light Virginia leaf and stalk	51.5	53.1	16.4 gray-white	2.53	8.54	5.33		
6. Light Virginia leaf only	54	46.1	11.97 green-gray	2.0	6.86	3.11	1.045	2.09
7. Dark Virginia leaf and stalk	48.5	51.8	14.7 gray	4.8	8.40	1.5		
8. Dark Virginia leaf only	52	49.8	12.53 gray	2.63	8.20	1.7	1.46	2.93

1. The samples were dried and the woody fibre and extract were also dried at 212°. The watery infusions of all contained ammoniacal salts. The salts from the ash which were soluble in water consisted of sulphates, carbonates, phosphates, and chlorides: the bases being potassa and lime. The solution by hydrochloric acid contained lime, alumina, phosphate of lime, and oxide of iron.

3. Contained oxide of manganese in small quantity; sulphates in watery solution of ash abundant. Hydrochloric solution contained an abundance of lime.

4. A trace of manganese; a trace only of phosphoric acid in watery solution.

5. Contained abundance of oxide of manganese.

6. Abundance of oxide of manganese.

7. A mere trace of oxide of manganese, and a trace of oxide of iron; only a trace of alumina.

8. A trace of oxide of manganese; quantity of oxide of iron very great; only a trace of alumina.

The following are the results of the analysis of the fresh leaves of tobacco by Passelt and Reinmann, (Mag. Phar. XXIV. and XXV.)

Nicotina	0.06
Nicotianine	0.01
Bitter extract	2.87
Gum	1.74
Gluten and albumen	1.31
Resin	0.27
Malic acid	0.51
Malate of ammonia	0.12
Sulphate of potassa	0.05
Chloride of potassium	0.06
Malate and nitrate of potassa	0.10
Phosphate of lime	0.17
Malate of lime	0.24
Silica	0.09
Lignine and trace of starch	4.97
Water	88.28
	100.85

CUBA TOBACCO.

NEAR VICKSBURG, MISSISSIPPI, *December* 22, 1849.

DEAR SIR:—I intended to send you a full account of our success in raising Cuba tobacco in this State, but absence from home, until too late for your Report, prevented me. There is a considerable quantity raised here, but it is in small lots of half to one acre, and all made into *Regalia* cigars, and sold in this State. They sell from $15 to $30 per M., the price depending principally on the care and attention given in the curing, &c. I have realized the latter price for mine the last two years. I pay five dollars per M. for making, and board the hand. A good hand will make from 200 to 250 per day, and boxes holding 100 cost 5 cents each. 100 lbs. tobacco will make about 4 thousand cigars. An acre will produce about 600 lbs. of this tobacco; it generally nets me, in this way, about one dollar per pound.

The crop in this State, I am confident, is not one-half that of last year, owing to the worm being worse than ever was known; and most persons raising it being cotton planters, who were all badly in the grass, the tobacco patch was neglected.

Owing to the causes above stated, it is impossible to form an estimate of the actual amount raised in the State, but I think the next census will cause many to open their eyes with astonishment.

If you have on hand any seed of choice kinds of tobacco, (especially *Persian*, the kind *Bengal cheroots* are made of, or *Brazilian*,) and will forward me a small quantity of each, I will esteem it a great favor, and send you an account of my experiment with them in time for your next Report.

Most respectfully yours, &c. R. Y. ROGERS.

Hon. THOMAS EWBANK,

Commissioner of Patents.

CENTENNIAL HEMP.

(TRANSLATED FROM THE FRENCH, BY F. G. SKINNER.)

A FOREIGN missionary, writing from China, thus describes a variety of hemp called Centennial: "I must now allude to a species of hemp growing in the district in which I am now travelling, between the degrees 31 and 34 north latitude. This hemp is called by the Chinese *tsin-ma*, or green hemp; it differs much from the *ho-ma*, which is the species in ordinary cultivation with us. The green hemp is not sown, but is planted, like sugar cane. The method pursued is this: after giving the land a thorough working towards the end of February, shoots are taken from an old *tsin-ma* bed and carefully set out, three inches deep and six inches apart; these shoots readily take root, and in about a month the stems begin to rise, and in forty days thereafter they attain a height of six or seven feet. The stem, hollow like that of ordinary hemp, is about half an inch in diameter. The leaf, heart-shaped, as large as the hand and very succulent, is green within, the outside being whitish and covered with down. Once well set and afterward well tended, a field will yield annual crops for *a hundred years.* The cultivation is simple: a manuring once in two or three years, and with the exception of December and January, a monthly hoeing is all that is required.

"This hemp is never pulled, but like sugar cane is cut as near the ground as possible; nor is it ever rotted or broken. Immediately after cutting, the bark is stripped from the stalks, commencing at the butt. This bark is composed of two parts: the first, which is green, is thrown away; the second is white, and constitutes the true hemp. The leaves remain upon the soil and serve to keep up its fertility; and the ligneous stems, after the removal of the bark, are made into matches.

"The *tsin-ma* yields three crops a year; the first in June, the second towards the last of August or the first of September. The third crop, which is of less value, is gathered in November. Immediately on the removal of one growth of stems, another springs up to replace it.

"This hemp is bought by the Canton merchants, and sells readily at from six to eight dollars per hundred. The quality of the green hemp is very superior to that of the *ho-ma* (common hemp); it is stronger, makes a better cloth, and sells higher.

"This hemp might be easily spun, and indeed it might be prepared in every way as ordinary hemp. The Chinese, however, do not spin the *tsin-ma*, preferring to weave it just as it comes from the plant. The ends of the filaments are united by a slight twist of the thumb and finger; it is then done into bundles and delivered to the weaver.

"I omitted to mention that the green hemp bore seed, but it is pretended that the plant cannot be propagated in that way. The *tsin-ma* is found growing wild on the mountains, and though used by the poor it is not near so valuable as when improved by cultivation.

"J. BERTRAND,
"*Apostolic Missionary, China.*"

Another variety of hemp from China is described by the French journals. It is now successfully cultivated in the south of France, attains a height of twenty-four feet, with a circumference of five inches, ripens its seed perfectly in the southern departments, and is called the *Lomacorchasus.*

SAVANNAH, ANDREW CO., MO., *October* 26, 1849.

SIR :—One of your circulars of July last having fallen into my hands, in accordance with your request I beg leave to offer the following as an accurate estimate of the cost of cultivating and preparing for market the product of one acre of dew-rotted hemp, it being the great staple of this section of country. In this county, Buchanan, Platte, Clinton, Holt, Nodaway, and Atchison, comprising the Platte country, hemp, Indian corn, hogs, and cattle are the only articles enumerated in your circular to which farmers pay much attention. Our soil and climate are well adapted to the growth and cultivation of each; but the first named, hemp, is now, and will in future be the great staple of the whole of north-western Missouri, as it will at all times pay a handsomer profit to the farmer than any other article that can be produced in a country so destitute of shipping facilities as the counties high up the Missouri river are.

The following estimate is made for one acre of hemp, and it is confidently believed it will not vary much from the actual cost of cultivating one or more acres, and will apply to any section of the hemp-growing country. Ten years ago I purchased the first lot of hemp grown in this county, but it was too small a lot to ship. It was then only raised for home consumption; it is now a great article of trade.

The average raised per acre is 800 lbs., which is worth to the producer at home, at $5 per cwt		$40.00
Cost of cultivating one acre:		
Rent of land	$2.00	
One and a fourth bushels of seed	0.94	
Seeding	3.00	
Cutting	3.00	
Shocking	0.50	
Spreading	0.50	
Taking up after rotted	0.50	
Breaking 800 weight	8.00	
Hauling to river	2.00	
		20.44
		$19.56

Thus leaving to the grower $19.56 per acre, after paying for all the labor attending the cultivation.

After this profit to the farmer, it falls into the hands of the merchant or buyer, who, after paying expenses to the St. Louis market, realizes as follows:

Paying for one ton on the bank of the river	$100.00
Baling ready for shipment, per ton	3.00
Storage	2.00
Freight to St. Louis	8.00

Insurance	1.80
Commission for selling	3.00
Weighing	.40
Drayage and storage at St. Louis one month	1.00
	$119.20

It is sold at $125, thus netting to the merchant $5.80. It may be proper to mention, however, that this calculation applies only to the operations in hemp of this year, and will likely be about the same for the next, (1850.)

This county is well adapted to wheat, but it does not pay as well. 30 to 40 bushels can be raised to the acre, and the crop scarcely ever fails, nor has it any enemies. The bearded red-chaff is preferred by almost every one.

We have a home market for cattle, horses, and mules, and but few find their way to the Southern markets.

Very respectfully,
G. W. SAMUEL.

Hon. Thomas Ewbank,
Commissioner of Patents.

NEW MODE OF WATER-ROTTING HEMP.

[We copy from the Louisville (Ky.) Democrat, the following letters on the subject of hemp culture in the United States, and would invite the attention of hemp-growers to the valuable suggestions therein contained.]

I take pleasure in communicating to the hemp-growers of the West the annexed paper from Mr. J. Anderson, of Louisville, Ky., pertaining to this highly important branch of our agriculture.

An active, ardent, intelligent mind has been devoted almost exclusively to this subject, in all its various bearings, for the last eight years; during which time a great number and variety of experiments have been made, constructing and re-constructing machinery of different sorts, and incurring a heavy outlay of money, not less than twenty-five thousand dollars, in making experiments only. At length he thinks he has attained the object so intensely sought for,—the true and right management of hemp, from the cutting to its being prepared for spinning.

In the course of his numerous experiments, he has constructed a milling machine, by which hemp is softened and refined to the requisite condition for the manufacture of fine fabrics. This machine he estimates very highly, as, by its use, common dew-rotted hemp may be cheaply and expeditiously prepared to make fine linen.

The advantages to be derived from the use of his brake are quite evident; they are very cheap, made mostly of cast iron, and of simple construction, costing less than one hundred and fifty dollars. A common horse-mill of two-horse power will be sufficient, with four hands, to clean a ton per day, as Mr. A. informs me. This enables the farmer to get his crop to market in the fall, instead of the spring, as this brake will completely clean hemp in a half-rotted state, producing a much better article, and increasing the yield sixteen to twenty per cent. in weight of lint.

His process of water-rotting has also the great advantage of getting the crop early to market. It produces a very superior article, having a rich, oily, lively appearance, from which can be made as strong and as durable cordage as can be made from any hemp whatever; the durability is insured from the fact, that the albumen is effectually cured by the natural heat generated in the mass in bulk.

The Navy of the United States will probably consume eight hundred tons of water-rotted hemp a year. Not a half has, as yet, been produced at home. All this hemp, in the course of a few years, will be manufactured into suitable cordage for the navy of the nation, at Memphis, in Tenn., where the government has established, and nearly completed, the best and most perfect rope-walk ever built.

The various manufactories and the general commerce of the country consume more hemp than has heretofore been produced. An increased production will be required to supply our wants, and if the quality is improved, as Mr. Anderson anticipates, the quantity may be indefinitely increased. After supplying ourselves—that is, the national navy, manufactories, and our own shipping—we then have the markets of the world for the surplus.

I am informed that good Russian hemp cannot be imported for a less sum than two hundred and twenty dollars per ton.

I respectfully call the attention of hemp-growers to Mr. Anderson's improvements.

LEWIS SANDERS.

LOUISVILLE, *April* 3, 1849.

MR. LEWIS SANDERS, *U. S. Hemp Agent.*

SIR:—Knowing your anxiety to further the progress of the hemp interest of the Western States, it has occurred to me to address a few remarks to you on that subject, derived from my own experience, from a series of experiments for the past eight years.

1st. In relation to the dew-rotted hemp. It has been, and still is, the practice of hemp-growers to allow their hemp (after spreading in the fall of the year) to remain exposed to the action of the atmosphere until a decomposition of the fibre has progressed so far as to enable them to break it with facility on the hand-brake; the quality is thereby rendered unequal, the original strength much impaired, its texture destroyed, and its weight much reduced. In consequence of the undue exposure of this article to the blighting influence of the atmosphere, a decomposition of the fibre has commenced, and its destruction is accordingly hastened, whenever exposed to ordinary heat and moisture; hence its want of durability, in comparison with water-rotted hemp.

This defect in the great staple of the West can be obviated, and will be, in the progress of time; it might be obviated at once by pursuing a better and more economical process than that heretofore observed.

Let the hemp remain in the swath, on the field where it grew and was cut; a few rains will suffice to cure it for the brake; or after sufficient exposure to the sun, it may be stacked for fall spreading; when, after a few rains, or when half-rotted, it may be shocked, preparatory to breaking. Either of these processes would be at present objected to by the practical

farmer in consequence, as he would say, of the impossibility of breaking and cleaning it. The mind of the farmer is of course directed to the hand-brake, (when he arrives at that conclusion,) while mine is directed to my improved roller hemp mill, now in successful operation near this city. By the aid of this new and simple machine, hemp, half-rotted, can be broken with great rapidity; it does not impair the quality or strength of the fibre, but has a tendency to loosen the wood, by a milling process. When the wood is so severed, it is an easy matter for one hand to clean 500 to 600 pounds per day, on the hand-brake; either by scutching, or by whipping and shaking. The quality of the article so produced is bright, soft, and lustrous.

2d. In relation to water-rotting hemp. The method adopted by farmers is to allow the hemp to remain immersed in water until the glutinous matter is completely dissolved; the consequence is a considerable impairing of the strength of the fibre: for a complete solution of the gummy matter could not take place without fermentation, and fermentation is the beginning of decay. I am aware that farmers are forced to this alternative to enable them to break and clean on the hemp-brake; but hereafter they should produce a stronger and more durable article, and thereby not only supersede the Russian hemp, but become exporters of the article to all parts of Europe. To produce an article of hemp suited to the consumption of the Navy Department, it is only necessary to immerse the hemp for a period of twenty-four hours, then withdraw the water, and let the hemp remain in bulk until the generation of natural heat takes place; that will be observed in the course of ten or twenty hours after a thorough impregnation by the heat; then inundate a second time, and let it remain until you are prepared for its convenient removal. It may, after the process of heating, remain in the water for months without any disposition towards fermentation; and surely, if it does not ferment in the water, there is no danger of its doing so in cordage.

With the aid of the improved milling machine, I am sure that a good hand could clean 500 pounds per day on the hand-brake, hemp prepared as above. Hemp so prepared is remarkable for its weight and oily appearance, and just the article that would make the superintendent of the United States rope-walk exclaim, "America can beat the world."

I am, truly, your friend,

JAMES ANDERSON.

VI.

MISCELLANEOUS COMMUNICATIONS.

EXPLANATION OF PLATE 2.

Fig. 1. A grain of wheat opened to show the cavity in which the caterpillar of *Tinea granella* had fed, with the excrement at the apex.
Fig. 2. Several grains united by the same caterpillar.
Fig. 3. The caterpillar of *Tinea granella.*
Fig. 4.* The same magnified.
Fig. 5. A group of the cocoons spun by the same.
Fig. 6. The *chrysalis* taken out of a cocoon.
Fig. 7.* The same magnified.
Fig. 8. A *chrysalis* sticking in a cocoon after the moth was hatched.
Fig. 9. *Tinea granella* at rest.
Fig. 10.* The same flying and magnified.
q. The natural dimensions.
Fig. 11. *Calandra oryzæ,* the rice-weevil.
Fig. 12.* The same magnified.
*a.** One of the mandibles or jaws.
*b.** The maxilla.
*c.** The palpus or feeler.
*d.** The antenna or horn.
Fig. 13. A grain of wheat opened to show the burrows of two beetles.
Fig. 14.* The same magnified.
e. The maggot of *Calandra oryzæ.*
p. The burrow of *Cucujus testaceus.*
Fig. 15. A grain of wheat.
f. The hole eaten by the *larva* of *Calandra oryzæ.*
Fig. 16.* The same grain magnified.
f. The hole perforated by the little maggot.
Fig. 17.* The grain of wheat opened to show the perfect weevil inside.
Fig. 18.* The *pupa* of *Calandra oryzæ.*
g. The natural size.
Fig. 19.* The parasitic fly, *Meraporus graminicola.*
h. The natural size.
Fig. 20. *Calandra granaria,* the granary weevil.
Fig. 21.* The same magnified.
Fig. 22.* *Larva* of *Silvanus Surinamensis.*
i. The natural length.
Fig. 23.* *Pupa* of the same.
j. The natural length.
Fig. 24.* *Silvanus Surinamensis.*
k. The natural length

Fig. 25.* *Larva of Cucujus testaceus.*
l. The natural dimensions.
Fig. 26.* *Cucujus testaceus.*
m. The natural size.
Fig. 27.* *Cadelle* or *Larva* of *Trogosita Mauritanica.*
n. The natural length.
Fig. 28.* *Trogosita Mauritanica.*
o. The natural length.

Obs.—Those numbers and letters with a * attached refer to the objects which are represented larger than life.

OBSERVATIONS ON VARIOUS INSECTS AFFECTING GRAIN.

(Condensed from Journal of Royal Agricultural Society.*)

Tinea granella.—(The wolf, or little grain moth.) (Plate 2, figs. 9 and 10.) This moth is completely established in this country as well as in every part of Europe. It is called in English works "The mottled woolen moth," and has received the scientific appellation of *Tinea granella.* The caterpillars do incredible mischief to bonded and housed corn laid up in granaries, and they are, I believe, called "White corn-worms." From April till August the little moth is found in granaries and magazines, resting by day on the walls and beams, and flying about only at night unless disturbed. Soon after they have escaped from the chrysalis the sexes pair, and the female lays one or two eggs on each grain of corn until she has deposited thirty or more; they are so minute that they can only be detected by a good magnifying glass, when they appear of an oval form and of a yellowish-white color.

The small white worms hatch in a few days, and immediately penetrate the grain, carefully closing up the aperture with their roundish white excrement, which is held together by a fine web. (Pl. 2, fig. 1.) When a single grain is not sufficient for its nourishment, the larva unites a second grain to the first by the same web, and thus ultimately adds together a great number, (fig. 2,) forming a secure habitation, which at the same time is well stored with provisions. When the maggots are almost full-grown, they often leave their lodgings in great numbers, running over the grain and covering the whole surface so effectually with a thick web of a grayish-white color, that scarcely a grain of corn is visible. In August or September the caterpillars arrive at maturity, when they leave the corn heaps and search for a safe and suitable place to undergo their metamorphosis, and at this period they are most observed. They form their cocoons (fig. 5) by gnawing the wood and working it up into their web, in any chink in the floor, walls, or roof, which are frequently swarming with them, and these cocoons, being of the form and size of a grain of corn, look like one dusted over. It there remains in its snug and warm berth in the larva state through the winter, and does not change to a chrysalis until the month of March following, and in a backward spring not until May. The pupa (fig. 6) is of a deep

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* Observations on the Natural History and Economy of various Insects affecting the corn-crops in the field and granary, including Moths, Weevils, and other Beetles, &c.—By John Curtis, F. L. S. &c.

chestnut color, the abdominal rings being of a shining yellow tint, and the apex is furnished with two little points, (fig. 7, the same magnified.) In two or three weeks after they have assumed the pupa form the moth hatches, with almost perfect wings at its birth, I have heard, leaving the empty chrysalis sticking half out of the cocoon, (fig. 8.)

It is difficult to guard against the introduction of this moth, since it deposits its eggs on the sheaves in the field, as well as after the grain is stored and threshed out, and will feed as freely upon barley, rye, and oats, as upon wheat. It is, however, not difficult to suggest palliatives, if not remedies, and if the following rules are strictly observed, few persons will suffer from the inroads of this insect:—

1st. Before replenishing an empty granary or loft, the floor should be well scoured with hot water and soft-soap or lees if practicable; if not, it must be well brushed with a fine stiff broom, to clean out the chinks or fissures between the boards. The roof and beams should be whitewashed, as well as the walls, with lime-water used as hot as possible; and these operations would have greater effect if performed in the winter months. Sprinkling the floor with salt dissolved in strong vinegar has been recommended, and might be very serviceable.

2dly. In granaries already stored, where the caterpillars are at work, whatever method for their destruction is resorted to by heat, ventilation, or otherwise, it must be employed during the summer from the end of May to the end of August, occasionally a month earlier or later, as during the winter these larvæ are not to be found among the corn heaps; they retire in the autumn to conceal themselves in fissures and cracks in the floors and walls, and form their cocoons.

3dly. The moths themselves may be destroyed in spring by burning lamps or gas lights in dark granaries; they being attracted by the flame, fly into it, and are sufficiently injured to prevent their doing further mischief; and at the same season the grain should be frequently turned over to destroy the eggs and disturb the young larvæ. All cracks and broken places in the walls and roof should be stopped with plaster of Paris, or cement, and the apertures for ventilation should be covered with a wire gauze.

Kiln-drying at about 78° Fahrenheit will kill the larvæ when they are feeding. *Cold currents of air*, introduced by small windows near the floor, thus keeping up an artificial cold atmosphere, are very effectual. *Burning sulphur* and creating sulphuric acid in a close apartment will kill the moths.

A small heap of grain left undisturbed, frequently turning over the rest, is a sure and simple plan of catching the larvæ, where they can easily be destroyed by pouring on boiling water.

When diseased grain is used for seed, it should be sown deep to prevent the moths from escaping through the soil. It is also desirable to cut the grain in good season, for if it is suffered to remain too long in the field the moths are enabled to lay their eggs in the ears, and are thus introduced into the barn.

CORN OR GRAIN WEEVILS.

From the numerous statements and complaints that have been transmitted to me, I am inclined to believe that no insect does more mischief to stored grain than these weevils, of which there are two species. One is called by Linnæus *Calandra oryzæ*, the rice-weevil, (Plate 2, figs. 11 and 12.) It is frequently found among rice, and is supposed to have been originally im-

ported from the East Indies in that important article of food. I have seen it infesting wheat from Ancona, sent to Mark Lane for sale in 1844, and from various granaries. Prof. Royle also transmitted me specimens which were destroying East Indian wheat in the ships by which it was brought over to this country.

The other species of corn-weevil alluded to, called *Calandra granaria*, the granary-weevil, (Plate 2, figs. 20 and 21,) is more common in this country. No insect is more formidable to man than this little pest, since it attacks the principal basis of his food; and they are sometimes so numerous in a heap of grain as to destroy it altogether, leaving nothing but the chaff. The sexes pair as soon as the weather becomes sufficiently warm in spring, and the female makes a little hole in the grain of wheat with her rostrum, and deposits an egg in it, from whence is hatched a little maggot, which during its growth consumes the entire contents of the grain, and eventually becoming a perfect beetle, eats its way out. From the moment of pairing until the time when the weevil is hatched occupies about 40 or 45 days, from which it is evident that there are many generations in a year, and they multiply much more rapidly in a hot country. From a very curious table, established upon the multiplication of the weevils, by adding together the number of each generation, the result obtained is the sum total of 6,045 individuals proceeding from one pair only during the five months from the 15th April to the 15th September. As Olivier says: "One cannot be any longer astonished that enormous heaps of corn are sometimes so speedily devoured." The holes formed by the female, in which her eggs are laid, are not perpendicular to the surface of the grains, but oblique or even parallel, and stopped with a kind of gluten of the same color as the corn. The female never lays more than one egg in each grain, which is not long in hatching, and when lodged in the grain is perfectly secure from changes in the atmosphere, because the excrement that it makes seems to close the opening by which it entered, and even when the corn is removed it is not incommoded by any shaking it may undergo.

It will be observed that the weevils are not found on the surface, but some inches deep in the corn-heaps; it is there that they live, very often couple, and that the females lay their eggs. Moreover, on looking at a heap of corn, one cannot detect the operations of these insects in the grains where they are lodged; they have the same form, the same appearance, they seem to be as large and as firm as those which are not attacked. It is only by the weight that they can be detected, and on throwing a handful from a heap into water, the diseased grains will float.

So long as the weather remains hot the weevils do not quit the corn-heaps they have invaded, unless they are obliged to abandon them by stirring the corn with shovels or passing it through a sieve. When the mornings begin to be cool, all the weevils, young and old, abandon the corn-heaps which are, no longer a retreat sufficiently warm for them; they retire into the crevices of the walls, into the cracks in wood and planks, wherever they can find a safe abode that secures them from the cold, which makes them desert the grain heaps.

It is, however, wrong to suppose that the weevils remain in a torpid state during the whole winter, to regain on the return of spring the grain heaps which they have abandoned, and to recommence laying eggs there. A general and constant rule among insects is, that those which have paired die soon afterwards, the males almost immediately, the females as soon as

they have performed their office of laying the eggs, and that they pass the winter in the egg or larva state. It is undoubtedly seldom that those which have not fulfilled the destiny of nature can brave the rigor of the season, and do not perish before the ensuing spring. The weevils seem to love darkness, and to remain undisturbed, since, when they are exposed to the daylight, they scamper off to conceal themselves. Such is Olivier's account.

So important is this subject, that a variety of remedies have been successively proposed for many years, which I shall now consider; and although some of them may appear trifling, they will not only show how far advanced we are above our ancestors in such knowledge, but they may chance to elicit better modes of application, and even to suggest new ideas. We first hear of fumigation with herbs having a strong and disagreeable odor; but this seems to have been useless, as the weevils, by burying themselves among the grain, are by no means incommoded, while the corn has suffered from fetid and disgusting scents which have been communicated to it. It is even asserted that the scent of spirits of turpentine appeared to cause the weevils no inconvenience; but I think if it had been persevered in for several consecutive days, excluding at the same time ingress of air, that they must have been destroyed. The fumes of sulphur are said to be equally inefficient; and all these fumigations are still less adapted to destroy the larvæ, as the smoke cannot penetrate among the grain.

Olivier says: "Experiments have proved, that a sudden heat of about 75° Fahrenheit is sufficient to destroy the weevils without burning them, but this would not suffocate the insects when they are buried in a heap of corn. It has been observed that a heat of 167° or 190° Fahr. is necessary to kill the weevils in the stove; but this excessive heat, which also destroys the eggs and larvæ inclosed in the grain, is capable of drying the corn too much, even of burning it, and yet does not preserve it from the insects secreted in the granary, which will come out and attack it, if there be no other for them."

Mr. Mills, in a communication to the "Entomological Transactions," says: "A gentleman of the name of Wilkinson, in Madeira, has now established a heated room with hot-water pipes, in which he receives as many as 800 bags of wheat at a time; these become heated through at about 135°, and the wheat when resifted is perfectly cleansed from these noxious insects, and makes quite as good bread as before. I also tried some of it in the ground that had been subjected to this heat, and it came up."

Ventilation and the introduction of currents of cold air is highly recommended, and also the forming of little heaps of grain in the spring to act as decoys, which has already been suggested among the remedies for the "little grain-moth."

In a French work, we are told it is an excellent plan "to lay fleeces of wool which have not been scoured, on the grain; the oily matter attracts the insects among the wool, where they soon die, from what cause is not exactly known."

After all that has been said, I shall revert to the necessity of keeping granaries clean and aired, and by turning over the grain frequently, and taking every opportunity of whitewashing the walls when the granary is empty, much loss from these insects will be avoided.

Silvanus Surinamensis—Linn. (The corn silvanus.) (Pl. 2, figs. 22, 23, and 24.) From the specific name it may be inferred that this little beetle has been originally imported from Surinam. It is now a constant inhabit-

ant of our stores and warehouses, and from its infesting corn, it was described by Fabricius as *Anobium frumentarium*, and subsequently as *Dermestes sex-dentatum*, from the spines on the side of its thorax. Linnæus' name, however, has the priority. This insect appears to be spread all over the habitable globe, probably carried in vessels with grain and dried fruits.

Cucujus testaceus. (The corn cucujus.) (Pl. 2, figs. 25 and 26.) This is a still smaller beetle which accompanies the corn-weevils, and has been found in great abundance in a granary in Cambridge, by Mr. C. C. Babington. This is decidedly a corn-feeding insect, and in examining the wheat from Ancona, and cutting open the grains, I found two with the cucujus in them, as shown by the cavity at the top of fig. 13, and more distinctly exhibited at fig. 14, *p*; in this cell, which is opposite to the point occupied by the corn-weevil, the *cucujus* was lying dead, and there were two or three little holes in the skin of the wheat as minute as the point of a needle. This insect was named by Fabricius from its color.

Trogosita Mauritanica. (The cadelle.) (Pl. 2, figs. 27 and 28.) This beetle has been introduced from the shores of Africa, in which country it is abundant as well as in America, and has now spread itself over a great part of Europe, so that it is common in the south of France in the larva state, and makes great havoc among the corn in granaries; it also attacks dead trees, and even bread and nuts. The larvæ are called *Cadelle* in the south of France, and they are particularly destructive, because they eat the outside of the grain, and passing from one to another, they injure as much or more than they consume.

The beetle is carnivorous, and makes some amends for the mischief it had done in its larva state by destroying the *tinea granella*; it is not yet known where the female deposits its eggs.

W. P. F.

EXPLANATION OF PLATE 3.

Fig. 17. Part of a broad bean in flower.
Fig. 18. A humble-bee named *Bombus terrestris*.
 k. The cavity bitten by the humble-bee.
Fig. 19.* The proboscis or mouth of the humble-bee.
 u. The mandibles.
 m. The maxillæ.
 n. The labial palpi.
 o. The tongue.
Fig. 20. The bean-louse, black dolphin, or collier, *Aphis Fabæ*.
Fig. 21.* The same magnified.
Fig. 22.* A winged male ditto.
Fig. 23. The natural size.
Fig. 24. Outside of a Sicilian bean infested with *Bruchus flavimanus*.
 p. A spot beneath which lies the pupa or beetle.
 q. A hole eaten by the inclosed beetle.
Fig. 25. The same bean split, showing the inside.
 r. The maggot of the *Bruchus* in the cell.
 s. A pupa in the cell.
Fig. 26.* The maggot taken out and magnified.
Fig. 27.* The pupa magnified.
Fig. 28. A Russian bean infested by *Bruchus granarius*.
Fig. 29. A horse-bean first eaten by *Bruchus granarius*, and afterwards by the maggots of a little moth, as shown at *u*.
Fig. 30. A smaller bean containing *Bruchus granarius*.
 v. The pupa in a cell.
Fig. 31. *Bruchus granarius* walking, in outline.
Fig. 32.* The same magnified.
Fig. 33. A pea infested by *Bruchus Pisi*.
 w. The head of the beetle thrust out.
Fig. 34.* *Bruchus Pisi* magnified.
Fig. 35. The natural length.
Fig. 36. Portion of a sack matted together by *Tinea sarcitella*.
 x. The maggots in their cells.
 y. The pupæ, ditto.
Fig. 37. Outline of the caterpillar, full grown.
Fig. 38.* The same magnified.
Fig. 39. Cell or cocoon containing the chrysalis.
Fig. 40.* The chrysalis or pupa magnified.
Fig. 41. *Tinea sarcitella* at rest.
Fig. 42.* The same moth flying and magnified.

Obs.—Those numbers with a * attached refer to the objects which are represented larger than life.

OBSERVATIONS ON VARIOUS INSECTS AFFECTING PEAS AND BEANS.*

Bombus terrestris, (the *Humble-bee.*) It is a well-established fact that bees are exceedingly serviceable in rendering flowers prolific; but it is not so generally known that many are greatly injured by them, and few farmers are probably aware that humble-bees in some seasons deprive them of a very large proportion of their crop of beans, by puncturing the base of the flowers, and rendering the incipient pod entirely or partially abortive. Many garden flowers are similarly attacked by bees, as *larkspurs*, *azaleas*, *fuchsias*, *salvias*, *snap-dragons*, &c.

The cause of the humble-bees thus damaging the crop of beans and flowers arises possibly from some unusually large females—for individuals of the same species vary greatly in size—not being able to creep into many flowers that are too small to admit of their bodies, and too long to allow of their reaching the nectary with their tongues; they are not, however, to be thus balked of their feast, and instinct directs them to the exact spot on the calyx beneath which the nectar is stored, (Pl. 3, fig. 17, *k*;) these they nibble with their strong jaws, (fig. 19,) until they are enabled to introduce their proboscis (figs. 18 and 19) and obtain the desired treasure. The orifice is invariably on the upper side of the calyx, and near the centre, or a little towards the base: the incision passes through the calyx as well as the upper lobe of the flower into the nectary containing the honey, which proves a great detriment to the crop, for the punctured flowers cannot perfect all the beans in the seed-vessel, or the pod proves altogether abortive.†

Humble-bees form their nests in old loose walls, among broken bricks and stones shot down as rubbish, in banks, at the roots of trees, &c. During the first days of spring, or even earlier, the females come forth to collect honey and pollen, from the blossoms of the willow. In the summer, humble-bees may be seen gathering moss, for the purpose of covering their nests, which are sometimes lined with wax. If it be desirable to stop the mischief caused by these insects, the nests must be destroyed at the end of summer, and the females collected as they come out in spring. They have, however, many natural enemies among the feathered tribes, especially the butcher-bird, *Lanius colluris*, which impales them on thorns—also a fly called *Volucella inanis*, which deposits its eggs in the humble-bees' nests, and the larvæ live on the brood of bees.

Aphides, or Plant-lice.—Another tribe of insects which destroy or injure the peas and beans, are the Aphides, from which no crop is entirely free; the former of these plants are often smothered with *lice*, or *green-dolphin*, as they are termed, and the latter seldom escape the attacks of another species, which, from their sooty color, are called the *black-flies*, *black-dolphins*, or *colliers*. Like all the insects of this family, their appearance is very sudden, and their increase so prodigious, that crops suffer severely

* See Journal of Royal Agricultural Society, vol. vii. p. 404.
† Gardener's Chronicle, vol. i. p. 485

from their visits. In 1833, the beans were almost totally destroyed by them in Yorkshire, England.*

Mr. Dickson says: "In such summers as are dry, beans are frequently liable to be much injured by the attacks of the *black-fly*, or what is often termed the *dolphin*; the whole field in particular cases being in danger of being destroyed in the course of a few days. In order to prevent this mischief, it is the practice in some places to cut off the tops by means of a scythe or other sharp implement, as it is mostly on the tops of the plants that the insect first appears. When this method is adopted, it should be performed on their first appearance, otherwise little benefit can be produced; as perhaps by removing the first insects that show themselves, their propagation may in some degree be prevented."†

The *Aphides* exhaust the plants by sucking the sap, so that when they abound it is vain to calculate upon a good crop, if they are not speedily arrested. The beans should be topped on their first appearance, and the tops collected and burnt. The larvæ of the Lady-bird, and the maggots of flies and of minute *ichneumons*, soon come to the aid of the farmer, and destroy immense quantities of these plant-lice; and where these agents are known to be numerous, the destruction of this class of noxious insects may safely be intrusted to their instinct.

Bruchidæ, (the pea and bean beetles.) Peas and beans are often inoculated in the field by a group of beetles, called improperly "bugs" by farmers; and this subjects them, like the cereal crops, to great injury and waste after being stacked or housed. From their destructive nibbling propensities, these beetles have received the name of *Bruchus;* of these there are several species: among them the *Bruchus granarius*, or grain bruchus, (Pl. 3, figs. 31 and 32,) and the *Bruchus flavimanus*, which is somewhat larger than the former. Both these infest beans to a limited extent in this country; but the most common, as well as the most destructive species is the *Bruchus Pisi*, or "pea-bug," as it is commonly called, (figs. 34 and 35.) This insect is a species of beetle well known to farmers. In some parts of this country and Europe, it has made such ravages among peas, as to compel the inhabitants wholly to abandon the culture of this crop. Like the Hessian fly and the grain-weevil of Europe, it was introduced into this country in seed imported from abroad.

As the economy and habits of these insects have been well investigated, I will relate what has been published concerning them.‡ Early in summer, when the peas are in flower and forming pods, the female beetle deposits an egg in almost every pea. When matured, the pea does not appear injured, but on close examination we can discover in each a minute black speck, which is the *larva.* Dr. Harris says: "The eggs are laid only during the night, or in cloudy weather. Each egg is placed opposite the pea, and the holes through which they pass are so fine as scarcely to be seen, and are soon closed." The larva remains in the pea all winter, gradually consuming its internal substance, and in spring it is transformed into a perfect insect, pierces the skin, and emerges to deposit its eggs in the new pods. The larva has a soft whitish body, and a head small, scaly, and armed with strong and sharp cutting mandibles. The maggot, when it reaches maturity

* Journal of Royal Agricultural Society, vol. vii. p. 416.

† Dickson's Practical Agriculture, vol. ii. p. 597.

‡ Observations on the Natural History and Economy of Insects, &c., by John Curtis F. L. S., published in Journal of Royal Agricultural Society of England.

gnaws a circular hole to the husk or skin of the pea, and even cuts round the inner surface which covers the aperture; so that, when changed to a beetle, by a slight dilation of its body it forces off the lid, and emerges the the new-born *Bruchus*, as represented in fig. 33. In many of the peas the insect will be found dead. Whether this arises from a lower temperature than they are accustomed to, not invigorating them sufficiently to leave their habitations, or whether they return to feed when they cannot make their escape readily, which is the case when the peas are confined in sacks, or heaped up in a warehouse, has not been determined.

The vitality of the seed is not usually destroyed; as the egg is deposited in the side of the pea, where the insect when hatched emerges, leaving the germ uninjured. It is doubtful, however, whether the plants raised from such peas are as strong and healthy as those from perfect seed: and they should therefore never be used for seed when it can be avoided.

This insect, though common in all the older States, is almost wholly unknown in Canada, owing perhaps to its not being able to withstand the severity of a Canadian winter. Hence thousands of bushels of peas are annually brought from Canada to the United States for seed.

Remedies and Preventives.—Late sowing has often proved a successful preventive against the ravages of the pea-bug. If sown the last of May or first of June, the peas will not blossom or form their pods until after the beetles have disappeared. But peas sown so late often suffer from the drought, and rarely yield a very abundant crop. It is recommended in *Hovey's Magazine* to subject the peas immediately after they are gathered to the action of boiling water for *one minute;* by this means the larvæ are destroyed, which are at this time just below the integuments of the pea, without affecting the vitality of the seeds. If the peas remain in the boiling water *four minutes*, most of them will be killed. To kiln-dry the peas at a heat of 130° to 140° will answer the same purpose, and does not destroy the germ. When they are intended for culinary purposes, some such means should be taken to destroy the larvæ, as instances are given by French writers where persons have been *poisoned* from eating worm-eaten peas, containing the maggots and beetles of the *Bruchus Pisi.*

Tinea sarcitella, (the sack or woolen moth.) (Pl. 3, figs. 41 and 42.) The economy of this little insect is somewhat like the grain-moth, as its larvæ feed indiscriminately on vegetable and animal substances. It frequently assists in the destruction of peas and beans when housed, which were previously infested by the *Bruchus Pisi.*

Peas, when stored in sacks or bags, if not thoroughly dry, often breed these moths, which cement the sacks so strongly together as in some instances to require the strength of two men to separate them.*

The *tinea sarcitella* has long been known as a most mischievous little moth in our dwelling-houses, where it is common the greater portion of the spring, summer, and autumn. The female deposits her eggs upon clothes, blankets, curtains, carpets, or any woolen articles upon which the larvæ feed, living in cylindrical cases, which they form of the materials on which they subsist, and in which they change into pupæ, (fig. 40:) the caterpillar is about half an inch long when full fed, (figs. 37 and 38:) it is soft and white, and a lively little animal, sparingly covered with fine, longish hairs.

The mischief done to peas and beans, which are rendered useless and

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* Jour. Roy. Agr. Soc. vol. vii. p. 458.

very offensive by the webs and excrements of these caterpillars, is principally owing to their being housed in a damp state. It is therefore necessary to keep the places where peas or other seeds are stored as dry and well-ventilated as possible. It is also found very beneficial to air in the sun or kiln-dry the sacks, to destroy the innumerable mites, insects, and vermin which often infest them; and if sacks were thus kept sweet and clean, and were only manufactured of hemp, or vegetable thread, they would never be infested by the *tinea sarcitella.* These insects, like all others, may be destroyed by fumigating with sulphur, or by allowing spirits of turpentine poured into saucers to evaporate in the infested places. When small quantities of seeds are required to be kept in bags or drawers, they will be preserved from insects if well dusted with pepper, or a few ounces of camphor will be found to answer the same purpose. W. P. F.

IRRIGATION.

(*Translated principally from the "Journal d'Agriculture pratique."*)

BY F. G. SKINNER.

That the yield of a crop is generally in proportion to the quantity of manure applied to it, and that profit does not depend so much upon extent of surface cultivated as upon manure and good tillage, are agricultural axioms, the natural deduction from which is, that a small, well-cultivated, and heavily manured farm, will return a greater net revenue than a much larger one, with the same expenditure in labor and manure spread over a larger surface: and of this fact, we are surrounded by proofs on every side. In all the older States, under an improved system of tillage and manuring, we find mere fractions of what were once large estates, yielding not only greater proportional profits, but actually larger aggregate returns, than did the original estates of four or five times the extent of surface.

Manure is the chief source of agricultural prosperity; by its means bad land is converted into good, and the most barren wastes compelled to yield the richest products. Of all known manures, none are of such value and importance as those from the stable and cattle-yard; for these are adapted to a greater number of locations and variety of soils, and to all plants, and modes of cultivation. True, substances are frequently used as fertilizers, much more energetic than ordinary farm-yard manure; but it is only to *supply a deficiency of the latter, or to increase its action.* These fertilizers are not to be had in sufficient quantity, nor is their transportation so easy, as to dispense with the necessity for stable manure, without which the highest degree of productiveness is never attained, and without which in most cases agriculture would become an unprofitable pursuit.

As the productiveness of a farm or crop depends less upon the extent cultivated than upon the mode of cultivation and the amount of manure applied, so does the quantity of manure made depend less upon the number of animals fed than upon the amount and quality of food consumed; and in relation to manure, cattle are only to be looked upon as machines for the conversion of forage and other food into that substance. A part of the forage being assimilated by the animals for their sustenance and the remainder voided in the form of manure, the value of which mainly depends

upon the richness of the food; for it is well known that the droppings of a lean ill-fed beast are inferior in quantity and quality to those from a fat one. It may, therefore, be assumed as a maxim, that the prosperity of a farm depends chiefly upon the amount of food consumed upon it; and in general, the amount of hay made upon an estate is a safe indication of its condition, and an increasing production of forage is a sure sign of agricultural improvement.

As a means of producing food for stock, *irrigation*, whenever tried, takes precedence of every other, and the chief reason is, that instead of *consuming, it produces manure.*

The process of irrigation has invariably, wherever carried out, proved of almost incalculable value, and there are, probably, few countries that would derive greater benefits from its general introduction than the United States. Indeed, there are large portions of our recently acquired territories in New Mexico and California that must ever remain barren wastes without it.

A bounteous Providence, in giving water to the cultivator, furnished him the means of increasing his crops to an almost indefinite extent; for by means of irrigation, this simple element, poured out in most places in such abundant profusion, becomes the "kindling instrument of life and energy to the vegetable world." Water is indispensable to the perfect development of plants, for its elements enter into the composition of all of them. Not only does it enter chemically into their organization, but it also holds in solution foreign matter which serves them as manure, and which is either deposited or rendered of easy assimilation: thus from 75 to 95 per cent. of nearly all green plants consists of this element. Almost all spring waters contain carbonic acid, and frequently sulphur, lime, and a variety of salts, a greater part, if not all of which, being decomposed and absorbed by the plants, contribute greatly to their development.*

Rivers, small streams, and most spring brooks carry with them minute particles of earth which are deposited in the form of a rich mud or slime. Rain-water too, flowing over roads and fields, becomes charged with fertilizing principles, which are carried into the rivers, and finally lost in the ocean, if they are not arrested in their course by the skill of the cultivator, and applied as manure to his fields. The soils thus swept away form a mass of which it is difficult to form a conception, and continual changes are

* The following analyses, by Professor Johnston, exhibit the composition of the waters of four different rivers:

	Ale.	Eye.	Riglaw.	Wear.
Organic matter	1.75	1.64	2.58	0.92
Potash in the state of sulphate	1.68	0.80	0.72	1.50
Soda and chlorides	....	0.44	1.94	
Gypsum, (sulphate of lime,)	0.64	1.46	2.94	0.88
Carbonate of lime	5.28	3.48	7.32	7.92
Carbonate of magnesia	1.00	1.24	1.64	2.04
Chloride of magnesium	1.82	0.80	1.25	
Oxide of iron	0.56	0.48	0.60	0.56
Sulphuric acid	1.44	0.98	1.80	0.96
Chlorine	0.36	0.70	1.65	1.10
Silica	0.24	0.08	0.32	1.20
	14.77	12.10	24.76	17.08

being made upon the earth's surface by the constant but imperceptible action of water upon mountains and hills. It is calculated by Rinnel, that the hourly deposit of mud at the mouth of the Ganges amounts to 2,509,056,000 cubic feet, at the mouth of the Nile to 14,784,000, and at that of the Mississippi to 800,000. Few rivers, indeed, carry with them such enormous quantities of mud as the Ganges, the Nile, or the Mississippi, but all of them, nevertheless, sweep away to the ocean more or less of fertile soil of value to agriculture, and thus produce changes upon the surface of the globe, by which future generations may profit, it is true, but at the expense of our own. Mountains and hills are constantly washed by rains, all their fertile parts are carried off, and they finally become naked masses of barren rock if nature has not heaped upon them an inexhaustible supply of vegetable earth, or if the losses are not repaired or prevented by skillful management. Soils at the mouths of rivers, of recent formation, are the sources of malaria and other unhealthy emanations highly prejudicial to animal life. While nature by her vast combinations thus prepares fertile fields for generations to come, she does not forbid the exercise of man's ingenuity to compel the spendthrift waters to pay a passing tribute of fertility to his wasting fields. By covering the mountain slopes and hill sides with grass, and turning aside the streams for its irrigation, agriculture may diminish a portion of the evil, and profit by that which it cannot prevent.

In northern climates, irrigation so far, has only been applied to meadows, and but little, if at all, to cultivated or ploughed lands. At the south, under the burning zones of Asia, Africa, and America, water is essential to every species of cultivation. It is applied to the grains, to the vine, and indeed to every plant requiring a degree of moisture that cannot be derived from the atmosphere. Rice, the grain that probably contributes more than any other to the support of human life, and the most important product of southern climes, requires frequent and abundant irrigation; that its "foot should be in the water and its head in the sun," is an indispensable requisite to its profitable cultivation.

In warm climates, irrigation made itself felt as an absolute necessity by the most ancient nations, and stupendous works for the purpose were executed at a period now lost in the night of time. The best known to us are those alluded to in the books of Moses, and described by the profane writers.

From Upper Abyssinia, near the eastern coast of Africa, two chains of mountains descend parallel with the Red Sea, nearly to the Mediterranean; between these two chains flows the river Nile. From its source to about midway its length, it is hemmed in by high mountains, then it opens upon a vast plain which constitutes the kingdom of Egypt. With a surface one-third less than the State of Virginia, this kingdom supported in the time of Sesostris a population of 25,000,000, a standing army of 400,000 men, and was covered with superb structures and magnificent cities. It constituted the first and wealthiest kingdom of the earth; it was the sole emporium of corn to the surrounding nations; it was the birthplace of the sciences that civilized, and of the arts that adorned ancient Greece and Rome; and even now, modern nations are contending for mere fragments of her glorious monuments, with which to embellish their cities; and yet all this wealth, grandeur, power, and civilization may be fairly attributed to irrigation—irrigation on such a scale as the world never saw before or since. The whole territory of Egypt was divided by immense levees and dykes into three great zones, and the waters of a great river were controlled, and managed, and

used for agricultural purposes, as completely as if they had been those of a mere rivulet. Surrounded as Egypt is by naked and sterile mountains, and by the arid sands of the desert, (except upon the Mediterranean coast,) rains rarely fall there; the want of it is in a measure supplied by heavy dews, but still, without the annual overflow of the Nile, all vegetation would speedily wither away beneath a scorching sun. The river, unaided by artificial means, overflows a vast surface, but the ancient Egyptians doubled the extent of their arable lands by compelling the water to spread over a wider space; but time and barbarism have destroyed their works, the glory of Egypt is departed, and her habitable territory has shrunk to less than half its former dimensions. The Egyptians were not the only people who thus made water tributary to agriculture. In the now desolate regions surrounding the once proud cities of Nineveh and Babylon, the remains of aqueducts, tunnels, and canals yet exist, to overwhelm the wondering traveller with their stupendous proportions, and which prove, that even the waters of the Tigris and the Euphrates were rendered obedient to human skill and industry. In China, where agricultural art has remained stationary for centuries, the earliest travellers, Marco Polo, Ruberquis, and others, marked the care with which water was turned to irrigation, and the skill evinced in its application.

From Egypt the art of irrigation passed into Greece, but it never reached there the perfection attained in so many other arts drawn from the same source; and the reason is obvious,—the young men of Greece were educated to public life, they cultivated the finer arts, and the cares of husbandry were abandoned to slaves. Nevertheless, the worship of their gods, of fountains, and of rivers, and the ceremonies attached, prove that the irrigation of meadows and fields was one of the important operations of Grecian agriculture.

Persia, with her burning sky and sandy plains, owes the greater part of her fertility to the use of water, and in that kingdom the art of irrigation is duly appreciated. Laws are still in force there which existed long before the people of Greece grew to national importance, exempting from taxation for a certain number of years such lands as were most skillfully irrigated. From Greece, civilization, the sciences, and the arts passed into Italy, and with them the Romans acquired the art of irrigation, as is proved by the remains of canals and the testimony of the Roman writers on rural economy. The plains of the Milanese were enriched by the waters of the Po and the Adige, which were completely controlled by means of locks and dams, as is shown by an inscription still extant upon a marble tablet at the Roman gate of Milan.

The northern hordes of Goths and Vandals that overran the Roman empire, and who at a later period finally established themselves upon its ruins, though they remorselessly destroyed monuments and temples, spared the works dedicated to agriculture; the dams, sluices, and aqueducts were not only respected, but maintained in efficient repair, and at a later period, when peace prevailed, additional irrigating canals were dug, which are still in existence.

The Saracenic domination, which in the eighth century extended itself with great rapidity around the shores of the Mediterranean, was signalized in Spain by the impulse it gave to agriculture. From the banks of the Oxus and the skillfully watered plains of Persia, Syria, and Babylonia, along the African desert, through the island of Sicily, to the Spanish peninsula,

the indefatigable industry of the Saracens, and that of their ingenious successors the Moors, manifested itself in the prosecution of every kind of agricultural labor. In Spain they carried it to a degree of perfection which has never been surpassed in Europe, never equalled perhaps, except in Holland and the Netherlands.

They had seen in the East and thoroughly understood the one grand necessity of Southern agriculture. When it is said, and with truth, in such a climate as that of England, that drainage is the first great requisite of farming, it is only the expression of a truth which applies in the same sense to irrigation in all soils liable to drought. In England the superabundance of water, here its deficiency, is the great point for correction, anterior to every other improvement. The race of Spanish Arabs had the merit of extending this knowledge and the practice consequent upon it in Europe. By spacious reservoirs, canals, and aqueducts, they conveyed the great ELEMENT OF FERTILITY into remote districts, which had before been barren only for the want of it. Under their care and skill, the plants and vegetables of Asia and Africa for the first time grew side by side with the native products of Europe, and the sugar cane and the cotton plant laid the foundation for that great impulse to European art, which was destined at a later period to cause so great a change in the industry and commerce of the world. Even to this day the traveller in Grenada and Valencia, amidst scenes of utter apathy and indolence, varied only by a chronic system of intestine dissension, worthier of a savage than a civilized nation, often meets the remains of a once magnificent system of irrigation, standing like monuments of the infatigable labours of a race that has passed away, but carrying with them so lasting an attachment to Spain that, long after their final expulsion from Europe, they retained and handed down through many generations recorded titles of their estates, and even the very keys of their houses in the Spanish peninsula.* Hitherto the influence of Saracenic genius, though extending the whole length of the Mediterranean, on both its shores, had little opportunity or inducement to penetrate northward. Spain, their grand and final conquest and favorite settlement, and which had become a perfect model farm of southern agriculture, was too much separated on the only land side from the rest of western Europe, by the broad chain of the Pyrenees, to have produced any extended influence. Its position was altogether unfavorable to northern communication. What the Arab conquests, however, had failed to accomplish, the crusades providentially carried out. When the hosts of rude mail-clad warriors of the West, obedient to the call of the hermit-soldier, poured over the fruitful plains of the East, they witnessed a perfection in the agricultural art of which they had never dreamed before, and such of them as lived to return to their homes took with them the knowledge of irrigation, probably not the least valuable of the many benefits incidentally derived from those senseless expeditions.

The science of hydraulics has participated in the progress made by all the branches of human knowledge. It is conjectured, that in the middle ages, irrigation and the construction of works connected with it were based upon practice and observation only; but now the lamp of science lights the way, and we may proceed boldly onward with entire certainty as to results. Upon many points of Europe new canals have been dug to enable agriculture to profit by the fertilizing effects of water, and the practice of irrigation,

* Foster's "Mahometanism Unveiled."

even in that (as compared with the United States) moist climate, is extending in every direction.

In this short exposition it may be remarked, that man from the earliest ages has been led, both by nature and necessity, to water his meadows and fields; that even the most barbarous conquerors felt not only a just appreciation of what had been done for irrigation, but became irrigators themselves. We see, moreover, agriculture always progressing with national liberty and with the arts and sciences. The art of irrigation is, with the exception of the United States, now to be found among all civilized nations; and in certain parts of England and Germany it has made great progress: in the latter country it has probably made greater advances than elsewhere. The country of Seigen has acquired great celebrity for its system of irrigation. Protected and encouraged by the Duke of Nassau, it has become there really an art, and when reference is made in Germany to the method of watering meadows, it is always understood to be such as is practised on the banks of the Seig. Grading the soil—its distribution—the management of the water—in a word, all the processes, are subjected to rules that make of irrigation a real science—which we will now endeavor to explain in such of its details as are of easy application in the United States.

Water.—All the water existing in the atmosphere returns to the earth in the shape of rain, snow, hail, mist, or dew. The permeability of the earth's surface allows the infiltration of water, which descends until arrested by impervious strata of clay, rocks, &c. The fluid follows the inclinations of these strata until pressure or some other cause forces it to the surface, whence the origin of springs. These springs united form brooks, and the union of several of these, rivers; by which the waters flow into the sea. Thus this element forms an endless chain—rising from the sea in the form of vapor, it falls again to the earth, and thence returns anew to the ocean. All the water, then, applicable to irrigation, must be derived from rain, springs, brooks, rivers, or lakes.

Rain-water.—Of the rain-water that falls, the earth can absorb but a small portion. The remainder flows upon the surface to the brook or river towards which the slope of the land inclines. Rain-water at the moment of its fall is the purest of all others, but, in flowing over the surface, it carries off great quantities of fertilizing substances. By conducting these waters (after they have washed a certain space) over the surface of grass lands, they are to a certain extent filtered, and the greater part of the fertilizing matter they contain is deposited upon the sod. The fertilizing qualities of rain-water vary with the soils over which they pass. Thus water flowing over a calcareous soil is considered much better than that derived from a clay soil, because in the latter case a tenacious mud is sometimes deposited, which injures the grass if the irrigation is immediately followed by a drouth. Water flowing over a sandy soil also produces good effects, provided the sand is mixed with clay. But it often happens that such water carries along with it quantities of sand, which can be of benefit only to marshy land. To the use of rain-water for the purposes of irrigation there are two serious objections; first, the irregularity of supply, and then the great quantity of foreign matter usually carried along by it during heavy rains. In some cases, these objections may be obviated without much expense; for instance, in favorable situations dams may be constructed and the water retained until the foreign matter is deposited and until the proper moment for application.

Now and then the accumulated mud may be taken from these reservoirs, and it will, after exposure for a time to atmospheric influences, make excellent manure. Water derived from melting snow is also to be considered as rain-water, but, on account of its low temperature, it has no effect upon vegetation. It can only become useful when, after a detention in the reservoir it becomes warmer, or when it happens to be charged with slime which is deposited upon the meadow.

Spring waters have various properties, which are particularly manifested by their action upon vegetation. These properties are derived from the soil in which the water is amassed, or through which it flows before appearing at the surface. Water flowing through chalk or calcareous strata acts powerfully upon the growth of grass; issuing from a sandy soil or sandstone, its effects are similar, but not so marked. The tannin and other vegetable matters and acids, frequently contained in the waters issuing from forests, injure them for irrigation, and the same remark may be applied to water running from marshes. The temperature of spring water is various; in some cases, it is so low that the water will readily freeze, in others so high as to thaw ice and snow. For irrigation, water of a high temperature is always to be preferred, and very cold water should be detained in reservoirs until the temperature rises, before it is used.

The sweet grasses flourishing around a spring are indicative of the good quality of the water; the sour grasses, on the contrary, indicate the reverse. Water-cresses and long green filaments are good signs; but if, instead of these, the bottom of the stream be covered with a brown floculent substance, and the surface exhibit an oily appearance, its water is to be absolutely rejected.

The beneficial effects of water are greatly augmented by gathering it in a reservoir into which the wash from the house and stables is turned. Meadows in the immediate vicinity of and below the farm-yard thus acquire extraordinary fertility. To distant fields the urine may be conveyed in hogsheads, and mixed with the water in the reservoir; the water may also be enriched by throwing manure into it, but this would be bad economy unless there be a certainty that the whole of the water will be turned to account.*

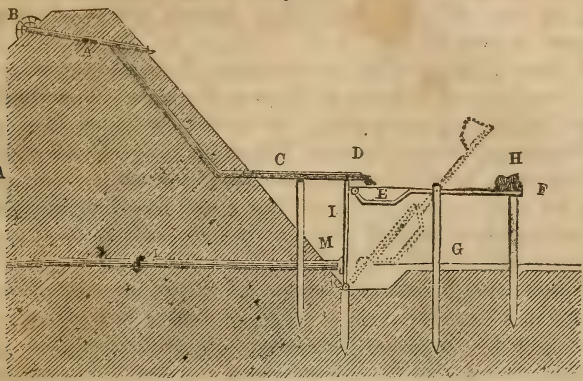
In the Vosges mountains, in eastern France, where irrigation is thoroughly understood, the system of reservoirs generally prevails, and one striking advantage attending it is, that the merest threads of water can be made available. In that country the liquids and offal from the dwelling and stables are collected together with the water from the spring into a reservoir, which is opened as often as it becomes full, and the land irrigated; but as the slope of these mountain meadows is often very great, the water has not time in its rapid flow to deposit all the fertilizing matter held in solution; hence, to avoid the loss of this, and to derive the utmost benefit from the element, it is caught in furrows, after irrigating a certain space, and conducted to a second reservoir, and there detained to water slopes lower down.

Thus, as is often the case, the same water is used several times by the same farmer, and sometimes by several, before it reaches the bottom of the valley. A similar method is practiced in several of the Swiss cantons. Rain

* Guano in sacks of open texture, and placed in the irrigating canal, would probably go further in this than in any other way that could be devised.

and spring water is gathered in reservoirs, and as these are often distant from the house, and it cannot always be known when they are full, a self-acting contrivance is used which lets off the water when it reaches a certain height, and closes the reservoir again when empty. (See drawing, fig. 1.) A is the

Fig. 1.



dam forming the reservoir. B is the highest point to which the water can rise. When the water reaches the point B it enters the pipe C, and at D pours into a wooden spoon E, the handle of which extends to and rests upon the point F. G is a strong post, with a slat at the top, through which the handle of the spoon passes, and in which it is fastened with an iron pin. H is a stone, to counterbalance the weight of the spoon. I is a narrow plank, movable at the hinge K. At M this plank is furnished with a leather bung, which stops the mouth of the conduit L, when the plank is kept in a perpendicular position by the pressure of the spoon E. The reservoir being full, the water passing by the pipe C falls into the spoon; this becoming heavier than the stone H, its counter-balance, falls, releases the plank I, and the water pours forth at M into the irrigating furrows. When the reservoir is empty, the spoon ascends, the plank I resumes the perpendicular, and the bung stops again the outlet at M. The dotted lines indicate the position of the spoon and the plank I, when the reservoir is full, and the water pouring out at M.

The progress lately made by the natural sciences now furnishes the means of creating artificial springs, supplying abundance of water to places hitherto deprived of it. These artificial springs, called *Artesian wells*, are made by boring to a greater or less depth. To obtain water by this process, there must exist beneath the surface a reservoir lacking a natural outlet; or there must be an underground stream with its source higher than the point at which the boring is effected; and, moreover, the pressure of the water must be such as to force it to the surface. These conditions are usually found united upon extensive plains, without springs at their surface, but which contain subterranean waters, descending from the surrounding mountains. Generally in this case the water is found between two impervious strata, and it gushes out at the surface when the upper stratum is perforated. It often occurs that these reservoirs are at a great depth, in which case boring becomes very expensive. A knowledge of geology and of the formation of the surrounding hills and mountains is an indispensable requisite to the acquirement of the art of boring for water, and it is there-

fore not advisable that the farmer should attempt it unless with the certainty of attaining his object at no very great depth, and at small cost.*

Besides a knowledge of geology, which may point out with some degree of certainty the existence of subterranean waters, there are other signs by which their presence may be detected; these are, plants flourishing only in moist places, and lastly, the emanations of vapor hanging over such spots. But generally springs discovered by these means are too feeble to be of much importance to irrigation.

Brook and River Water.—The composition of these waters is infinitely various; they lose by atmospheric influences the pernicious qualities sometimes possessed by spring water, and at certain seasons they carry with them an unctuous mud which renders them particularly valuable. There are streams, however, to which the same remarks made upon springs will apply. They are such as run through forests and marshes, and thus become charged with acid and astringent principles, unfavorable to the growth of grass. Still worse are the waters running from mines, forges, and tanneries. Streams which flow over calcareous soils, and which are charged with calcareous sediment, are of excellent application in winter and autumn; but their use must cease from the moment the grass begins to shoot in the spring, especially in time of drought, for the sediment they then deposit is injurious. When trout, pickerel, or crayfish thrive in a stream, the inference is, its waters are well adapted to irrigation, no matter what appearances may be in other respects.

In relation to this subject, Professor Johnston writes thus, describing some water sent him for analysis:—

"The water rises from several natural springs, which, after being united into one body, are directed into the artificial channels provided for the irrigation. It is perfectly transparent, colorless, and tasteless. It is very soft, scarcely giving any curd with soap; and the application of chemical tests shows it to contain a very minute proportion of gypsum and common salt.

"When evaporated to dryness, it leaves a very small residue of solid matter. An imperial gallon leaves only 5.2 grains. It is therefore an exceedingly pure water. I have never, indeed, met with a natural spring water in which the proportion of solid matter was so very small.

"When the proportion of solid matter is so minute as this, it is difficult to obtain a sufficient quantity for a quantitive analysis. Our supply of the water amounted only to about a gallon, so that the results of the subsequent analysis of the 5.2 grains, made by my first assistant, Dr. Vœlcker, are of course open to correction. This analysis gave for the composition of the solid matter in an imperial gallon:

"Alkaline salts, (chiefly common salt,)	1.14 grains.
Sulphate of lime	1.66
Carbonate of lime	0.26
Carbonate of magnesia	0.46
Organic matter	0.76
Silica	0.92
	5.20 grains.

* In portions of the State of Alabama these wells abound, and the expense of boring is not great.

"The result of this analysis is very interesting. It shows, that what we are in the habit of considering the purest natural spring waters, containing the smallest proportions of mineral water, may be used with advantage for the purposes of irrigation. It is true that, though the proportion of mineral matter is small, it is all of a useful kind, such as is fitted to supply the necessary wants of the growing herbage. The silica, the gypsum, the lime, the magnesia, and the alkaline salts, are all the food of plants, and are required in the growth of grasses. The absence of iron in any appreciable quantity is probably a favorable circumstance, and allows the other ingredients of the water to produce their full effect upon the vegetation. That these ingredients do really favor vegetable growth, is shown by the *numerous water-cresses* which grow naturally in the water. So far as my experience goes, indeed, I should say that any water in which water-cresses spring up may be safely employed for irrigation.

"The result is also encouraging. So long as it was believed that waters which descended from lime-stone districts, or which from other sources are impregnated with much mineral matter, would alone prove useful to the irrigator, doubt and hesitation could not fail to exist in the mind of the practical man as to the pecuniary advantage he might derive from any outlay upon irrigation. There is scarcely a stream among our hills and mountains in which the advantages of a skillful irrigation may not be confidently anticipated. Another point I may advert to as suggesting itself in connection with the composition of this water. If the benefit obtained from its use be so great as to increase the value of the grass nearly ten times, though the supplies of solid food it contains are so very small, how much greater should be the effect of those far more rich liquids that flow from our farm-yards, or which after showers of rain exude from our dung-heaps and escape into the nearest brook? Even enlightened farmers, who are aware of the value of the more concentrated liquids of their cattle-yards and stables, are yet sceptical as to the worth of such as, by their color, betray no marks of richness. The water of Glenythan is far less rich than any of these, and yet it caused land that rented for only one dollar and twenty cents an acre to yield *four tons of hay per acre.*"

Means of improving the Quality of Water.—Any water naturally unfitted for irrigation may be so treated as to be rendered useful for that purpose. Water may be unsuited to the growth of plants from three causes. It may be too cold, or, from a prolonged sojourn in a bed wanting inclination, it may be too warm; again, it may become stagnant and charged with principles inimical to vegetable life. As has already been stated, the collection of the water in reservoir until the temperature rises, is the remedy for the first evil; and motion communicated in various ways will correct the two last. The fertilizing power of a stream may be greatly augmented by placing in its bed a coffer, constructed of slats, which is filled with such manures and offal as can thus be disposed of. Patzig, who recommends this course, says a mixture of sheep's-dung and lime, thus used, produces the most astonishing results; moreover, says the same author, "Instead of burying the animals that die upon the farm, they should be thrown into this coffer, and the meadows will be thereby greatly benefited. In a short time a bluish colored oil will be seen upon the surface of the water, which, deposited upon the sod, communicates to vegetation the most extraordinary activity. The solvent power of running water is remarkable, and much greater than is usually supposed, for at the end of six months not a trace

remains of the carrion thrown into it; all, even the bones, are dissolved and carried off."

Action of Water upon different Varieties of Soil.—Wherever water exists, a meadow may be created and grass grown, and though this is the case on all soils, the action of water is nevertheless subject to variations depending upon the surface upon which it is applied. Water nourishes and stimulates vegetation—it affords a protection from sudden atmospheric changes, and, finally, it delivers the meadow from many enemies, as well animal as vegetable.

Water nourishes Plants.—Considered as a manure, (as has already been shown,) water contains mineral, vegetable, or animal particles, and occasionally all three. Water charged with any of these enriches by its deposits the surface over which it flows, but motion is necessary. The proof of this is, that the fertilizing action is much more apparent upon meadows of rapid inclination than upon those that are not. In this last case the water flows slowly, depositing only the grosser matter which it contains: while the finer particles, those the most favorable to vegetation, are lost, because there is not sufficient friction to separate them. Where the surface is too level, the water dwells upon it—a portion is absorbed, while the remainder is evaporated, not only without any beneficial effects, but acids are formed which destroy the valuable, and favor the growth of useless plants: this evil may often be remedied by increasing the quantity of water, as then from its own weight it acquires a swifter motion. If the grass should grow thicker, and better, along the edges of the trenches, the inference is, that the irrigation is imperfect, and the surface should receive more slope, that the action of the water may be extended to points more remote. Vegetation, however, to a certain extent, is always more active near the trenches; the water as it advances becomes despoiled of its enriching ingredients, and the ground should accordingly be so disposed as not to irrigate too wide a space with the same water. When the quantity of fluid to be disposed of is small, as is generally the case when that from springs is used, the surface can scarcely be too much inclined, for then the effects of the water seem to multiply and extend much farther. If, where the quantity of water at command is small, the slope cannot well be too great, it is not the case where the supply is abundant; and due care should be observed in proportioning the quantity of water to the degree of slope, for much water flowing rapidly will wash away the vegetable earth and lay bare the roots of the grass.

Water a Stimulant to Vegetation.—It has been observed that the pores on the under-side of the leaves of such plants as grow upon irrigated land are larger than those of the same plants growing elsewhere. The inference is, that the first possesses greater powers of absorption, and that irrigation increases their vitality, and renders them capable of taking in a greater quantity of the atmospheric gases.

Water protects and preserves Plants, for as long as water runs upon a meadow, the temperature remains uniform, and the ill effects of sudden atmospheric changes are prevented. Even where vegetation is overtaken by frost, it may be protected from injury by letting on the water before a thaw. Finally, water is an efficient agent in delivering meadows from destructive vermin and insects, such as mice, moles, grasshoppers, &c. In the same way, properly applied, it destroys the sedge and heath of dry, and the sour vegetation of cold, wet land.

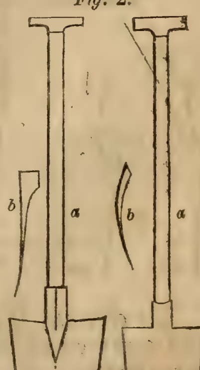
These different effects of water are modified by the nature of the soil it

flows over. Thus there is no soil better adapted to irrigation than that which is sandy; though naturally dry and sterile, it can with sufficient moisture be converted into excellent meadow, and this is probably the most profitable disposition to be made of it. Precaution, however, is necessary in watering sandy land, for if it be loose and shifting, it must be allowed, after being properly graded and seeded to grass, to stand a year before irrigation commences; otherwise the water will filter through the surface and re-appear in the lower trenches, oxidized and spoiled. It is bad economy to be deterred by expense from covering a sandy surface with grass. The quality of the grass is a secondary consideration, the main object is to *bind the sand*. Subsequent irrigation will soon change the nature of the growth, whatever it may be, and the finest herbage will supply its place. Should the sand be mixed with clay, even in small proportion, barely enough to give it some consistency, it may at once, without previous preparation, (other than grading,) be submitted to irrigation. Before a sandy soil becomes consolidated and well clothed with grass, it requires a great deal of water, and that which is turbid and muddy, as it usually is after rain, is best suited to it. An equal mixture of sand and clay makes the best meadow, yielding in quantity and quality the finest crops; it is improved by any water not naturally bad, and requires much less moisture than sandy land.

A stiff clay is not well adapted to "water meadows;" roots penetrate it with difficulty, and of all soils it is the most difficult to irrigate; very little water should be let on at a time, but the irrigation must be prolonged. A strong flow of water covers the surface with a cement which adds to the natural tenacity of the soil, and which becomes indurated, almost to the hardness of brick, on exposure to the sun. The best corrective in this case, where the means are at hand, is to add to the clay an earth of less consistency—the work will be facilitated and the vegetable growth increased. If in grading land for irrigation, it becomes necessary to remove the sod, (to be replaced when the grading is done,) there must be no precipitation in letting on the water; the sod must first be allowed to take root; else the water, running between it and the land, will prevent the roots from striking in, and the sod will perish.

Calcareous soils, being naturally warm and rarely retentive of moisture, are liable to suffer from drought, and for this reason they are peculiarly suited to, and are much improved by irrigation. Though almost any water is beneficial to them, that from springs is to be preferred, and they not only produce largely, but the hay is of the very best quality.

Fig. 2.



Preparation of the Soil.—Implements. In preparing land for irrigation, it is of consequence, as in every other agricultural process, that the implements and tools made use of should be the best of their kind. In agriculture, things seemingly of the smallest importance, though they contribute materially to success, are usually the last to occupy the attention of the inexperienced; and any imperfection in its various processes may generally be traced to a deficiency in, or neglect of the tools or implements employed; and for this reason what otherwise might appear rather too minute a description of the several instruments and the manner of using them in preparing land for irriga-

Fig. 3.

tion, is here given. *The spade*, (fig. 2, *a*.) Notwithstanding the simplicity of this implement, it is always important, and indeed indispensable, and should occupy the first place; *b* represents the spade in profile. The curve is essential. This implement is not destined to turn up the earth, but to pare off the sod, to level the bottom of trenches, to cut by a line, &c. Except the handle, (four feet long,) the whole is of iron, and the sides as well as the lower edge are kept tolerably sharp. The more spongy and mossy the ground is, the greater the necessity to keep the spade sharp, and as the implement is usually pushed forward by the pressure of the hands and chest, it requires a longer handle than those in ordinary use. Schwerz, from whom this description is borrowed, thinks it would be well (where the works are extensive) to have spades of different widths, to be used as the dimensions of the ditches and trenches may require. Where a single spade is used, it should not be wider than eight inches. Schwerz recommends still another, (figs. 3 and 4,) which he considers indispensable for lifting the sod, flattening the bottom of ditches, &c. The irrigators in the Seigen country do not attach as much importance to the spade as does Schwerz, and in its stead they use the shovel, (fig. 5.)

The round spade, (fig. 6,) though not mentioned by Schwerz, or used by the farmers of Seigen, will be found exceedingly useful. It is made of a single piece of wood, shod with a crescent (x, y) of steel, and is principally used for cutting the sod in lines by a cord. It may be as well to observe that in using it, it should not be withdrawn from the earth at every cut; on the contrary, it should be retained in the ground, pressed to the cord, and advanced by a circular motion one-third of its length at each cut.

Fig. 4.

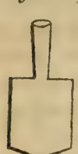


Fig. 5.

Fig. 6.

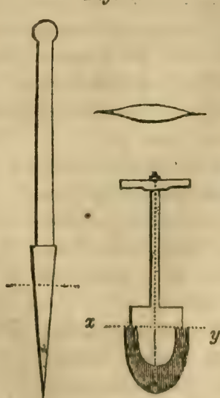
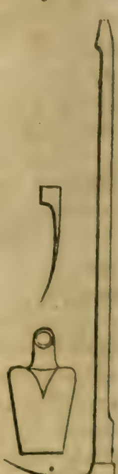


Fig. 7.

Fig. 8.



The crescent, (fig. 7.)—The round spade is best for the deeper ditches that carry off the water, but for the smaller irrigating trenches the crescent is preferred. The drawing is from the implement in use in Seigen. At the back of the blade a hoe is usually attached; this, though not essential, gives weight to the tool and effect to its blows. This hoe (fig. 8) may be

used separate from the crescent. The crescent serves to cut the edges of the trenches, and some skill is required for its use, as an awkward workman is very apt to cut the cord, which should always be used when straight lines are to be traced. When a trench is to be dug, the edges are cut with the crescent, and the sod between is taken out with the hoe. This operation is much facilitated when transverse cuts of the sod are made at short intervals. Fig. 7, *a*, *b*, are crescents without and with the grubbing hoe.

Fig. 9.

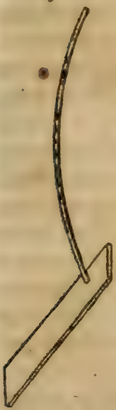
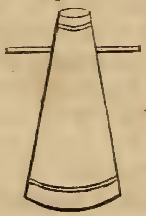


Fig. 9 is a flattening-board made of $\frac{1}{2}$ inch oak plank, as heavy as can be conveniently lifted, with a slightly curved handle. It is used for "patting" down the sod and loose soil. Figs. 10 and 11 are mauls, to be used where the action of the levelling-board is not sufficiently powerful. For moving sods and soil to short distances the ordinary wheelbarrow should be used, and to avoid making ruts the tire should be unusually

Fig. 10.

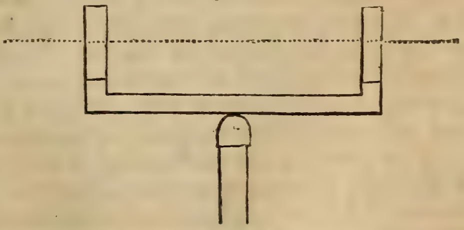
Fig. 11.



broad. The road-scraper is a valuable implement, but it should not be used to carry dirt more than 35 yards.

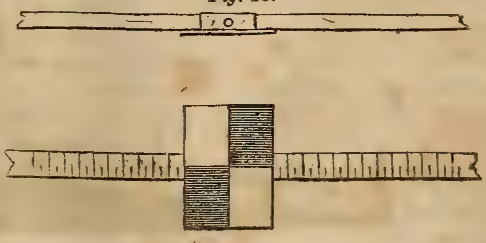
Levelling, or Grading.—Before cutting ditches or trenches, the surface should be levelled, in order to trace out the plan of the works to be executed. For this several instruments are required. First, the water-level, made of $\frac{1}{4}$ inch tin tube, a yard and a quarter long; the extremities of this tube are turned up at right angles, and are surmounted by glass tubes of the same diameter a few inches long. (See fig. 12.) This tube is supported by a base that may be lengthened or shortened at will, like a common spy-glass, and a sufficient quantity of any colored fluid is put in it to rise halfway in the glass tubes. When the surfaces of the fluid are exactly at the same height, a line drawn through them is horizontal. There are other instruments for levelling, but the above described is the cheapest, and will answer all ordinary purposes.

Fig. 12.



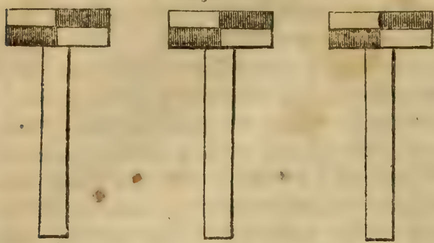
The levelling staff (fig. 13) is an indispensable adjunct to the water-level. This staff is three or four yards long, planed perfectly smooth down to two inches square, and marked off into feet and inches, or, what is better, tenths of a foot. Sliding upon the staff, and provided with a clamp or thumb-screw to fix it, is a board

Fig. 13.



five inches square, divided as in the figure. The central cross formed by the lines is the point sighted at in taking levels.

Fig. 14.

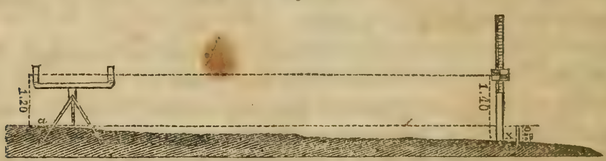


For short distances a much more simple instrument is used, the ordinary masons' level. The sighting boards, (fig. 14,) three in number, are pickets four feet and a half high, with boards at the top, as in the engraving. Two extreme points being given, these boards serve to ascertain one or more intermediate points on the same line, whether it be horizontal or inclined.

Besides the instruments above described, a surveyor's chain, a large square, stakes of different lengths, a maul, and gardener's line, should be provided. By levelling is understood the operation by means of which from a given point a horizontal line is drawn, and which is marked off with stakes, or it determines the degree of inclination formed by the surface of the ground with the horizontal line, or, finally, it determines upon the ground the points through which a line will pass, the inclination of which is given. For long lines the water-level is used, but for short distances the mason's level is more convenient.

If it is desired to draw a horizontal line from a given point *a* (fig. 15) to

Fig. 15.



another point *x*, the level is placed at *a*, so as to sight conveniently at *x*. An assistant, standing at the point *x*, in obedience to signs from the operator, raises or depresses the board upon the levelling staff until it is exactly at the height indicated by the water in the glass tubes. The height from the soil to the level of the water in the instrument is then measured and compared with that from the ground to the cross on the marking-board, and the difference indicates the depression of *x* below *a*.

If to preserve the inclination it becomes necessary to follow a very tortuous line, it may be avoided by sinking the ditch at certain points, and raising it by means of embankments at others. If the inclination between the points *a* and *x* is too great to be measured by the height of the staff, the distance must be divided into shorter lengths that can be measured. Thus (fig. 16) it is proposed to level the line AB or rather to ascertain the

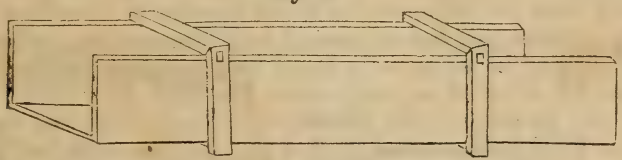
Fig. 16.

elevation of P above n, but the point n is so low as to render it impossible with the level to sight to P. The level is then moved to the point a, whence it is easy to sight to n; the point where the line of sight strikes the staff at n is marked. The level remaining in the same place, sight is then taken at m and the point of intersection also marked; a horizontal line $z\ x$ is thus obtained, and the difference of the two heights is the exact indication of the height of m above n, and so in succession with the other lines. The heights of m above n, of o above m, and of P above o, are added together, and their sum is the height of B above A.

Dams.—It is not necessary here to give directions for the construction of dams; but it may be as well to observe, that whenever they can be dispensed with by prolonging the irrigating ditch a few yards, it had better be done.

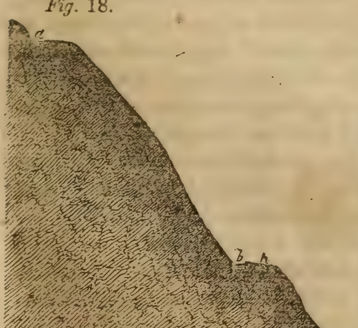
Aqueducts are frequently required to convey water over or under streams. They should be constructed as in fig. 17, of two-inch oak plank.

Fig. 17.



Hill-side meadows.—The irrigation of hill sides and mountain slopes, as practised at Gerhardsbrunn in Germany, is perfectly suited to the present state of American agriculture, and if generally adopted it would not fail to add vastly to our production of forage. The hill side to be watered is grubbed, the stones or rocks that can be conveniently moved are carried off, and the land thoroughly cleansed and reduced to a fine tilth. If, after this, slight depressions remain upon the surface which would retain water, they are filled up and the land is seeded to grass. As soon as a sod is formed sufficiently close to prevent washing, the main irrigating ditch is cut along the top of the field with a fall of not more than one foot in 3500: from the main ditch, small trenches two inches wide are neatly cut in the sod, and follow all the sinuosities of the ground, so as to cover as great a surface as possible with running water. If the surface to be irrigated is old field already turfed over, it is best not to break it up; all that is necessary is to remove any impediments to the sweep of the scythe, to cut the main ditch and trenches and let the water on immediately; the old sod will soon be replaced by grasses of the best quality.

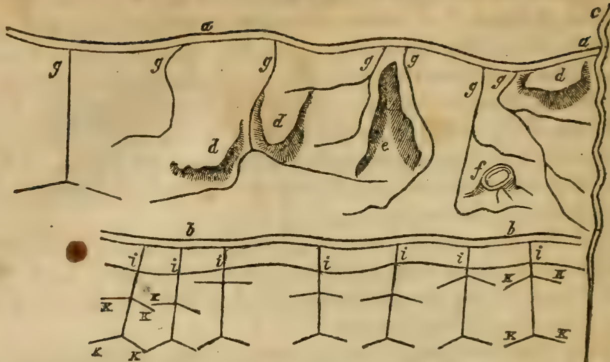
Fig. 18.



If the slope to be irrigated is very wide a second horizontal ditch should be cut in it, as in figs. 18 and 19.

a, a, and b, b, are the ditches distributing the water derived from c, to the upper and lower sections of the meadow—b, b, besides taking water from the stream, gathers that descending from the upper section of the meadow.

Fig. 19.



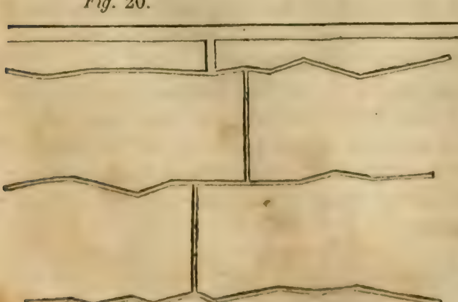
d, *d*, are rocks or hillocks that could not be removed, *g*, *g*, *g*, are the small irrigating trenches. Below and adjoining the canal *b*, *b*, is a road by which the hay from the upper section of the meadow is carried off.

i, *i*, *i*, *i*, are vertical trenches terminated by the horizontal trenches *k*, *k*, *k*. The road is graded so as to be irrigated and mowed; sometimes it is so arranged that one wheel of the cart runs in the ditch.

Many of the meadows in the district of Gerhardsbrunn are watered in this way; but when in the course of time the eminences are cut down and the depressions in the surfaces filled up, and all obstacles removed, a much better system of irrigation prevails. The bare spots occasioned by cutting down a hillock or filling up a hollow, must be sodded or seeded; if there is not enough sod to cover the entire surface, it should be cut into strips and pounded in. The improved irrigation of hilly meadows consists in replacing the irregular cuts by horizontal trenches, which are supplied by a distributing ditch. The irrigating trenches should be traced by the mason's level. They must be perfectly horizontal, though it is not necessary they should be perfectly straight; on the contrary, they may describe as many curves as the undulations of the surface and the necessity for preserving the horizontal may require.

As before stated, the distance between the trenches depends upon the nature and supply of the water and upon the inclination of the surface. On this subject it is difficult to lay down precise rules, because it would be necessary to measure the quantity of water and the degree of inclination. In general, however, it is best not to be too sparing of the smaller trenches; indeed, there cannot well be too many of them. On surfaces with a fall of four or five feet in a hundred, the distance between them should not exceed eighteen feet. The irrigating trenches may be supplied from the main canal by a vertical trench, or each irrigating trench may have its own feeder proceeding directly from the main canal, (figs. 20, 21.)

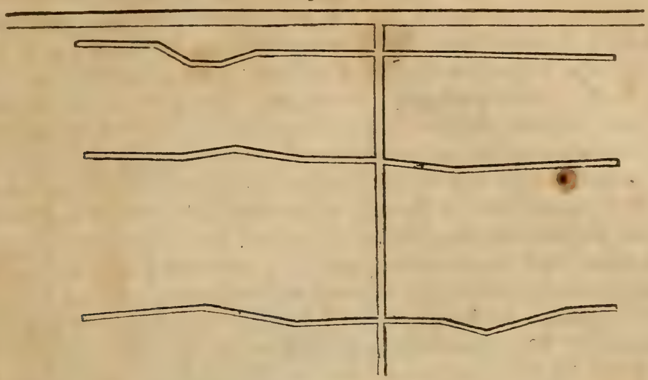
Fig. 20.



It will be perceived that in fig. 20, care has been taken to prevent the vertical trenches from corresponding directly with each other; because, if the fall (as is supposed in this case) is rapid, these verti-

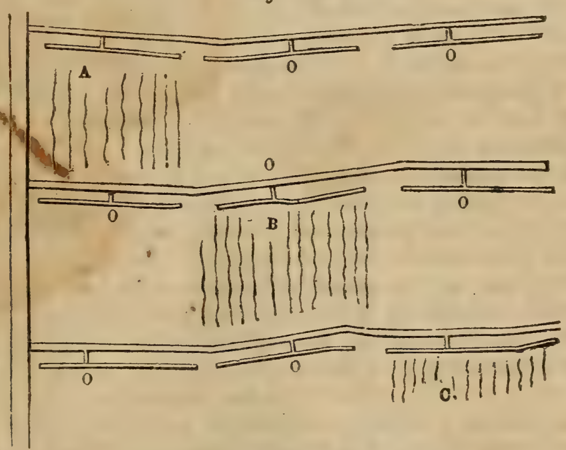
cal trenches would form a continuous straight line, and the increased action of the water in consequence would soon wash the land into gulleys.

Fig. 21.



A better arrangement is to furnish each irrigating trench with its own trench of supply, as in fig. 22.

Fig. 22.



If there should not be sufficient water to cover the whole surface at once, it is cut off from the different trenches at the points marked O, (an ordinary shingle will answer the purpose,) and only portions of the meadow, as at A, B, C, are irrigated, and the water may be shifted at will, from one spot to another, merely by moving the shingles at O.

General Directions.—The degree and duration of an irrigation may be modified by several causes. Thus water naturally suited to the purpose may be applied throughout the whole winter if the cold is not so great as to congeal it. Water of indifferent quality should not be used in winter, unless the meadow is manured. At a short distance from their source, the temperature of nearly all waters is favorable to vegetation, and they may therefore be used at all seasons. The effects of irrigation are also much modified by the seasons, and, as a general rule, autumn waterings are to be preferred; they renew the vigor of plants exhausted by previous cropping, the turf becomes closer, the young plants newly sprouted from the seeds left by the

first crop are invigorated to resist the coming winter, and the whole meadow, as it were, clothes itself to encounter the cold, and in early spring the grass starts forth more flourishing than ever. Again, in the fall water is more abundant—it is more highly charged with the elements of fertility; the ploughed grounds manured for the autumn-sown crops contribute to its richness, and at this season ordinary water becomes good, and good becomes excellent, and the irrigation should be prolonged as much as possible.

As soon as the last crop of grass is removed, and the wounds of the scythe have had time to heal, is the moment to turn on the water. But this is often postponed, in order to graze off the after-math: a portion of the winter provender may be saved by it, but the practice is to be deprecated, for not only is the subsequent crop injured, but the meadow is deprived of water in the month of September, the best of all others for irrigation.

The first waterings may be prolonged for three weeks, or even a month; after each, the meadow should be allowed to become dry. Under all circumstances of soil, season, or climate, it is essential the meadow should drain itself easily and rapidly; for without it the good effects of irrigation are lost. If the autumn is warm, the waterings must not be of long continuance, and as soon as a little scum or foam is perceived on the grass, they should cease; to be renewed as soon as the meadow becomes dry. If the water is of the best quality, the irrigation may be continued throughout the autumn as long as the weather does not become too cold, but the periods of irrigation should be diminished while those of draining are increased.

In winter, all irrigation with indifferent or bad water should cease, unless the land be well manured, in which case it may be prolonged, until interrupted by hard frost or snow, and even then if the quality of the water be good, the temperature high, and the land of easy drainage, there can be no objection to let the water run under the ice; it is in no danger of freezing, and the turf over which it flows remains green and continues to grow.

If the irrigation has been suspended in winter, the first that is given after the weather moderates should be prolonged; but the duration of those following must diminish as the season advances until May, when they are usually suspended, particularly if the water is muddy, for it may then "foul" the grass, when nearly ready for the scythe. Another precaution to be observed is, never to turn or take off the water at mid-day, particularly under a bright sun; evening is the favorable moment.

The most beneficial irrigations are those given in cloudy and rainy weather. With warm rains and southerly winds, herbaceous vegetation acquires great activity, and the growth of grass is rapid, and should the rain be cold, the brook water tempers its chilling effect upon the meadows.

Late spring frosts are to be dreaded, and all irrigation must cease when they are threatened. After the weather moderates, a few days' watering will repair, in a great degree, any damage that may have been done. If, however, there be an abundance of water at command, a full flow during the prevalence of frost will prove an efficient protection. The water is usually let on in the evening before the dew falls, or in the morning after it disappears. There is no reason assigned for this, but it is the usual practice.

Both the extremes of heat and cold are to be avoided during the irrigation; and if, as before stated, it may go on with suitable water when the thermometer falls one or two degrees below the freezing point, it is on the express condition that the water runs off freely, for wherever sheets of ice

remain in contact with the turf for some time, the shallow-rooted plants will perish, leaving none but those with deep roots and of little value.

In rainy seasons the object of irrigation is to fecundate, and not to give moisture; it may therefore be abundant with good water, and should be very slight with that which is bad.

Nature of the Soil.—Varieties in soil induce modifications in its irrigation. Thus light sands and gravel require longer and more frequent waterings than heavy clays, and these last require a longer time to drain. Inclination of surface is another modifying cause. A light soil, with little inclination of surface, should not be so long or so often under water as if it were much inclined, and a steep clay surface can receive more than a level one. The appearance of scum or foam upon the sod is an indication of suffering in the roots of some of the plants, and is a warning to shut off the water.

The abundance and duration of an irrigation should not be controlled by the vegetable surface alone, for frequently beneath a shallow vegetable surface an impervious clay is found, in which case the watering should be moderate; if, however, the sub-soil be gravel or sand, the irrigation may be more abundant.

Location and Exposure of Meadows.—The site of a meadow has an important bearing on its irrigation: thus, a sloping surface or a southern exposure requires more water than a level surface or a northern aspect. It may be remarked that meadows facing the south, though earlier than others, and producing better forage, are more liable to injury from late frosts, and it is best where the climate is variable not to force them by premature watering. Eastern should be more moderately irrigated than northern exposures, because vegetation is more active upon them, and they are more liable to white frosts. A western, being warmer, requires a little more water than an eastern aspect: and finally latitude is a serious consideration, since a southern evidently requires more water than a northern climate.

It may be objected that the wonders wrought by irrigation in Italy, Spain, and other southern countries, are to be attributed to climate, and that the system would not confer equal benefits upon the agriculture of the United States. To show how groundless such an objection would be, it will only be necessary to cite results obtained in England and Scotland, countries where the farmer has to contend, not with parching droughts, as in America, but with too much moisture.

Colman, in his "European Agriculture," states that the most extensive and finished works of irrigation, or as they are called there *water meadows*, to be found in England, are at Welbeck in Nottinghamshire, at the residence of the Duke of Portland. They considerably exceeded three hundred acres, and were being extended at the time of his visit. These meadows receive no other manure beyond that furnished by the water, yet *every acre in its produce, consumed by cattle on the farm, supplies manure for five acres of other land.* Corringham's Report of Nottinghamshire, alluding to these meadows, states that their annual value had been raised from £80 to £3600. The water meadows at Audley End farm are described by Mr. Colman as being formed of old pasture without disturbing the sod, and as yielding in two annual cuttings six tons to the acre. The same author concludes his description of the irrigated meadows he saw in England thus:

"I shall close this part of my subject with the remarks of Philip Pusey, Esq., M. P., which are always deserving the highest attention, and which are as applicable to many parts of the United States as to those

places to which they immediately refer:—'I have known Mr. Roals' farm for many years. It stands alone on the wild Exmoor range of mountain land. If any one asserted, that, for a trifling outlay, he could enable heath-covered steeps to rival, in produce and value, the old grazing grounds of Northamptonshire, he would be regarded as a dreamer. But if any owner of moors will visit Somerset, or North Devon, he will ascertain the literal truth of the statement, as I did five years ago. All that is required is a streamlet trickling down the mountain side, or a torrent descending rapidly along the bottom of the glen. *The profit of under-draining old arable land appears trifling, when compared with the profit of thus forming water meadows;* which, according to Mr. Roals, is more than one pound interest for two pounds invested.'

"The two pages of this report, which state no more than Mr. Roals himself has done, contain a talisman by which a mantle of luxuriant verdure might be spread over the mountain moors of Wales and Scotland, of Kerry and Connemara." New England especially, and many parts of the other States, are full of sites and means for such improvements, and in many cases the expense of labor and levelling the land, bringing the water into a body and placing it under control, would be met many times over by the profits of such improvements."

The account given by Mr. Colman of a system of irrigation with the sewerage water of Edinburgh is exceedingly interesting, and though by no means of general application, it is inserted here entire, with a view of showing how immensely valuable to agriculture would be the wash of our own cities, if, as in the Scotch capital, it were turned to account.

"I come next to speak of a system of irrigation established in Edinburgh, which I looked at with a good deal of interest, where the sewerage water from the drains of the city is applied to grass lands in its neighborhood, which by this means are rendered most extraordinarily productive.

"The drainage water from a large portion of the city of Edinburgh is collected into covered carriers and drains, and from these emptied into a stream of water, very properly, as one may suppose in such a case, called the *Foul Burn*, the term *burn* being the Scottish name for a small stream or brook. Here it passes along, in an open brook, among some flat lands, which by proper arrangements it is made to overflow. I should state that before it reaches the places where it is thus diffused, it is received in tanks, where the more solid parts are deposited. It does not require any extraordinary acuteness of smell, on approaching these irrigated lands, to become satisfied that the waters, even after passing from the cisterns or tanks, are sufficiently charged with odoriferous particles held in suspension.

"This water, thus received, is diffused over three hundred acres of land; and these lands are rendered productive to a most extraordinary degree. One of the principal proprietors, who held his land under a long lease, at a rent of £5 per acre, and sub-let this irrigated land at £30 per acre, informed me that it was sometimes cut seven times in a season. The grass is carried into the city, a distance of two and three miles, for the support of the cows, which supply the city with milk. Different channels or gutters are made for the water so that the whole may be flooded. It is applied generally after every cutting, where the situation admits of it; but it is found advisable not to apply it immediately upon the grass being cut, nor before it has obtained some small growth.

"The offensive exhalations from meadows thus treated have been the

subject of prosecutions at law. In the testimony adduced on these occasions, it has been stated that the rent for which some of these meadows are leased in small portions to cow-feeders varies on an average from £20 to £30 per acre. Some of the richest meadows were let, in 1835, at £38 per acre; and in that season of scarce forage, 1826, £57, or $285, per acre, were obtained for some meadows. The waste land called *Figget Whins*, containing thirty acres, and ten acres of poor sandy soil adjoining them, were formed into water meadows, in 1821, at an expense of £1000. The pasture of the Figget Whins used to be let for £40 per year, and that of the ten acres at £60. Now, the same ground, as meadows, lets for £15 or £20 an acre per year, and will probably let for more, as the land becomes more and more enriched; that is, land which before the irrigation let for about $500 per year, now, under this improvement, yields an annual rent of from $3000 to $4000. The irrigation is continued at different times, from the first of April to the middle of September. The parties interested in defending the use of this water for irrigating these lands, maintain that the grass produced in these meadows by this process supports in Edinburgh 3000 cows, and in Leith 600 cows. It is added, 'that the parties interested in the lands estimate the compensation which would induce them to discontinue the practice at £150,000, or $750,000. This is stated as the sum which the proprietors at the west side of the city would be entitled to, exclusive of those at the east, were the practice abolished by government.' "

It is to be hoped that the results of irrigation above described and vouched for by Mr. Colman, will be sufficient to awaken the American farmer to the incalculable value of the system, and induce him to put in practice the simple rules laid down in this essay.

UNDER-GROUND WATER-CONDUITS.

Pipes for conveying water for domestic use, for watering cattle, irrigation, or other purposes, may be economically constructed of concrete, made with hydraulic cement or water-lime, which are of the most permanent and substantial character.

The best hydraulic cement should be used, and care be observed that it be fresh burned, and that it has not been exposed to contact with air or moisture, which soon destroys its property of quickly hardening when made into mortar or concrete.

Clean river or bank sand, and clean gravel or pebbles about the size of a nutmeg, and from that down, will also be required. If the gravel cannot be found of suitable quality, as it generally may be at the bottom and on the banks of small streams, it may be prepared by twice screening from any gravel bank, the first to remove the large stones, and the second to sift out every thing less than an eighth of an inch in diameter.

Proportions.—The use of the sand and gravel has a two-fold object—1st, economy, the cement being by far the most costly of the three materials; 2dly, to prevent the mortar from cracking as it dries, which would be the case were cement alone used. For this latter purpose, sufficient cement paste should be used to fill the interstices of the sand, with a slight excess of the former to allow for imperfect manipulation; and with the mortar thus made the void space of the gravel is to be filled, allowing an excess of mortar as

before, to insure a concrete without air-holes or void space. To answer these conditions the following proportions have been found sufficient:

Cement, dry as it comes from the barrel	1	measure.
Sand, dry and clean	2	"
Gravel or pebbles, clean	4	"

Manipulation of the Concrete.—The sand and cement are to be thoroughly mixed by turning them over in a dry state a few times. Sufficient water is then sprinkled on from a watering-pot to moisten the heap, without forming it into mortar. Care is necessary in this part of the operation, for if sufficient water be added to form the cement and sand into a mortar, then the concrete when finished will not be of sufficient consistence to bear the blow of the mallet necessary to consolidate it, and it will not harden sufficiently quick after being laid to enable the core around which the pipe is formed to be withdrawn, and the work to proceed rapidly. On the other hand, if sufficient water be not added, the concrete will be pulverulent, and will not hang together while the pipe is being formed. The mortar, or moistened mixture of sand and cement thus formed, is then thrown upon the gravel or pebbles and the whole mixed together; this should all be done as rapidly as possible, and the concrete made use of immediately. It is best to make but small portions of concrete at a time, as it very rapidly deteriorates when exposed to the air before being used; a bushel or two of concrete is sufficient to make at once, and all that is made at a time should be used, and not left to the next day.

Trenches.—The trenches which are to hold the concrete pipes should be laid out by means of a surveyor's or mason's level, or by any other method which will insure a fall in the pipe from source to outlet; a very slight fall will be sufficient to insure the passage of the water, but to prevent the accumulation of sand, leaves, &c. upon the bottom of the pipe, a considerable fall is desirable; at least one or two feet in one hundred, and more if the ground allows it. It is also requisite that the fall be continuous, that is that there be no portions of the pipe level, as in this case sediment would be likely to accumulate in the level portion and stop the pipe up. The trenches should be dug one to three feet below the surface, or sufficiently low to avoid the influence of frost; they should also be formed wedge-shaped at the bottom, to economize material and form a support for the sides of the fresh-laid pipe when the latter is made by ramming the fresh concrete round a wooden core.

Forming the Pipes.—If the pipes be small, or of an interior diameter not exceeding one and a half inches, they may be formed at the bottom of the trench where they are to lie, over a core which is to be gradually withdrawn as the pipe progresses. For this purpose a roller or core is to be turned of hard wood, perfectly true and of uniform diameter, 15 to 18 inches in length. Commence by throwing in a trowel full of concrete, which settle by light blows of a mallet, and on this place the prepared wooden core, around which more concrete is thrown, which should be consolidated by repeated blows with the mallet; thus proceed settling the concrete round the core until about a foot of the pipe is formed, then carefully retract the roller a few inches and make a small addition to the pipe, always withdrawing the core as the pipe progresses, doing this with care that the fresh-made pipe may not be broken or cracked in the operation, and remembering that when the work is intermitted and again resumed, the new concrete should be well joined with the old to prevent leaks.

It is obvious that the concrete should be sufficiently stiff to support itself after the core is withdrawn and until it hardens, which will require more or less time according to the quality of the cement. In this manner by constantly withdrawing the core and by adding fresh concrete, a continuous pipe may be formed of indefinite length, which in durability will surpass any other which can be laid at the same cost. Cloudy, wet weather is very favorable to this part of the operation; if hot or cold weather be chosen, the pipe as fast as it is formed should be covered with a thin layer of earth, as a protection from sun in one case and frost in the other.

Should a larger water passage be required for purposes of irrigation or drains, the pipe may be constructed by forming large bricks of concrete one foot or more long and 1½ to 2 inches thick, by ramming the fresh-made concrete into moulds upon a flat clean barn or cellar floor, which bricks, after remaining a day or two to harden, may be built into a drain and covered immediately with earth. The mould, which should flare very slightly to facilitate the loosening of the brick, is constructed without top or bottom; it is then placed upon a smooth floor and the concrete rammed into it; the mould is then carefully raised, leaving the brick upon the floor, where it remains until sufficiently hard to be laid in the drain or piled up, until required. The mortar in this case may be made more moist than where the pipe is formed by ramming the concrete round a core.

For a drain 6 inches square in the clear, two sizes of bricks would be required, one for the top and bottom 10 inches wide by 12 to 18 inches long, and another for the sides 6 inches wide by a similar length and 2 inches thick.

At the commencement of the pipe or drain, an iron grating may be placed to exclude leaves, sticks, and small animals; and a basin or box sunk at the head of the pipe, one foot or more below its level, to receive the water before it flows into the pipe, will catch all the sand before it reaches the pipe, and may be cleaned out as often as necessary.

PENNSYLVANIA FARMING.—IMPROVED HAY-FORK.

East Brandywine, Chester Co., Pa., 10*th mo.*, 1849.

Esteemed Friend:—Feeling a warm interest in whatever relates to the Patent Office and its annual Reports, I most willingly attempt a compliance with the request contained in your Circular, though much doubting my ability to contribute any thing which may be useful.

We have had a very pleasant season in this part of the State, and the crops are all remarkably fine. I hear of no complaints, except towards the middle of the State, where the drought has to some extent injured the corn and grass. Our agriculture consists of three main branches, viz: raising grain, dairying, and feeding cattle.

More or less grain is raised by each farmer, and most farms are divided into 6 or 8 inclosures. One field (generally grass-sod) is turned down for corn, which is usually planted in hills 4 feet each way, and 4 stalks to the hill. It is afterwards well tended with the cultivator or corn-plough, and in this way we raise on our best lands from 50 to 100 bushels per acre. Seventy-five is considered a good crop. The following spring this field is put in with oats, which on good land grow very luxuriant. When the oats are taken off, the field is manured, and put in with wheat, and at the same

time timothy and clover seed are sown. It remains in grass until its time comes to be broken up in the regular rotation.

In former years there was a large portion of the land in this part of the State rendered comparatively barren by a slothful and imperfect system of farming; but under a more practical and scientific course of management, these vestiges of bad husbandry are fast disappearing; and it is truly gratifying to see land once comparatively worthless, now bearing heavy crops. A free use is made of lime, which costs ten cents per bushel at the kiln. From my own experience I am satisfied that deep ploughing and a moderate use of lime and plaster cannot be too highly recommended. But above all, attention should be paid to the careful saving and application of stable manure: for I am fully persuaded that the fertility of land may be easily maintained by the latter means alone.

We have here a very intelligent and enterprising population, composed of various denominations, living in perfect toleration and free social intercourse. A large number of manufactories have been established of various kinds, making a ready market for the products of agriculture.

I cannot conclude without attempting to bring to thy favorable notice a simple contrivance, lately introduced into our State, for pitching hay by horse-power. I put one up before harvest, and think it possesses great merit as a labor-saving implement. It consists of 3 pulleys, about 85 feet of $\frac{3}{4}$ inch rope, and a large fork. The head of the fork is about 28 inches in length, and $2\frac{1}{2}$ inches square, made of good wood. The handle should be $5\frac{1}{2}$ feet long—morticed into the head, and secured from splitting by a strap of iron clasped around the head, and extending some distance up the handle. The prongs should be made of good steel, 20 inches long, $\frac{5}{8}$ inch thick at the head, and tapering down to a point. They should be set in the head at equal distances apart, and with a burr attached, to screw them up tight. Two ropes, or iron rods, (fig. 1. *a*, *a*,) about three feet long, fastened to the ends of the head, are brought together at *b*, to which a pulley is attached. A

Fig. 1.

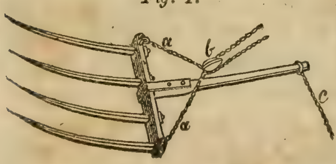
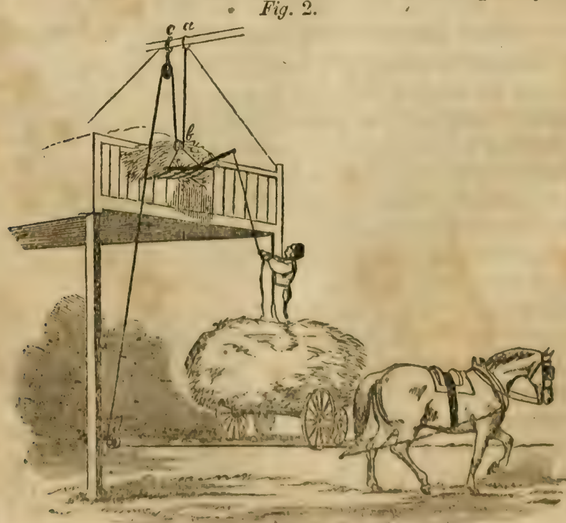


Fig. 2.



small rope, *c*, is also fastened to the end of the handle, in length to suit the height of the barn, by which the fork is kept level as it is raised to the top of the mow, where the hay is discharged by slackening the rope. In adjusting the machine, let one end of the main rope be attached to the peak of the rafter, about 3 feet over the bay, as at *a*, (fig. 2,) thence let it pass through the pulley *b* on the fork, then through the second pulley, *c*, and then through the third pulley, *d*, fixed to the lower part of the door-post, to give a level draft for the horse. One person on the load, one or two in the mow, and a boy to lead the horse, constitute the force necessary to unload hay in this manner; and, though a simple machine, it will be found to save much hard labor.

The horse-rake, and machines for threshing, and other purposes, have greatly lessened the labors of the farmer. But we greatly need some simple contrivance to mow grass by horse-power: all that have been invented are too complicated, and liable to get out of order. These remarks are all kindly submitted to thy better judgment and discretion.

Respectfully thy friend,

MORDECAI LARKIN.

Hon. Thomas Ewbank,
Commissioner of Patents.

PROPER TIME FOR FELLING TIMBER.

Concordville, Pa., *Nov.* 18*th*, 1849.

Esteemed Friend:—Through the "Delaware Co. Institute," I have received one of the circulars from the Patent Office, and I have noticed with surprise, that in all the valuable reports from this office, I have seen nothing said on the important subject of the *proper season for felling timber*, to secure its strength, durability, and other good qualities.

During an experience of more than forty years, as a plain, practical farmer, I have taken much interest in ascertaining the best season for felling timber, and I now state with confidence, that fencing timber, such as all kinds of oak, chestnut, red-hickory, and walnut, cut from the middle of July to the last of August, will last more than twice as long as when cut in winter, or common barking time in spring.

For instance:—cut a sapling, say five or six inches in diameter, for a lever, in the month of August, and another of similar quality and size in winter or spring. I *know*, if the first is stripped of its bark, (which at that time runs well,) it will raise, as a lever, at least *twice* the weight that can be raised by the latter.

Another great advantage derived from felling timber in the last running of the sap, (the time above specified,) is, that it is neither subject to dry-rot, nor to be injured by worms; while oak cut at this season, if kept off the ground, will season through two feet in diameter, and remain perfectly sound many years; whereas, if cut in winter or spring, it will be perfectly sap-rotten in two years.

For ship-building and other purposes where great expense is incurred in construction, the immense advantage of preparing the timber at the proper season must be evident to all.

I have no doubt, a ship built of timber cut between the middle of July

and the last of August, would last nearly twice as long as one built of timber cut at the usual time; and would bear infinitely more hard usage, as the timbers season more perfectly and are far harder.

A few years since, one of the large government ships, built in Philadelphia, of the very best materials, but several years in construction, when ordered to be finished and launched, was found upon inspection to be entirely worthless in many of the timbers, (though kept under cover,) from dry-rot.

In all my building for many years past, with large timbers of white and other oak, this has never occurred, nor are they subject to be worm-eaten.

Even firewood cut at the proper season is worth from 30 to 50 per cent. more than when cut in spring or winter.

If the above facts are considered of any value, please make use of them, and if those learned in such matters can assign any plausible reason for them, the theory may be of value to others, as well as thy friend.

With much respect,

WILLIAM PAINTER.

Hon. Thomas Ewbank,
Washington, D. C.

CHEMICAL PROPERTIES OF MILK AND BUTTER.

(BY WILLIAM PERRY FOGG.)

Modern Chemistry has thrown much light upon this very important branch of rural industry. Of all agricultural products, none is more valuable, more widely diffused, or more difficult to dispense with, than *milk*, and the butter and cheese manufactured from it. Many elaborate and careful experiments have been made by Boussingault in France, Dr. Thomson and other chemists in England, with the view to test the quantity and quality of milk produced by animals fed on different kinds of food. These experiments have elicited many important facts of great value to the dairy farmer; but much remains to be done, before this subject can be fully cleared up.

It is to be regretted that no experimental researches on the food of animals have been made and published in our own country; and that, when a large portion of the incomes of farmers is derived from the products of the dairy, this subject is so little understood. The economical production of milk by means of the machinery which nature has provided should be carefully studied, and reduced to a science. This article, which constitutes so large a proportion of human food, should be considered a *legitimate manufacture;* and improvements in the *machinery*, or the animals which elaborate it, would add millions to the agricultural wealth of the country.

Composition of Milk.—The component parts of milk in all animals, both herbivorous and carnivorous, are the same. It differs only in the proportions of its principal ingredients. The following table exhibits the composition of the milk of different animals, in its ordinary state, as found by Profs. Henry and Chevallier:

	Cow.	Ass.	Goat.	Ewe.
Casein, (cheese)	4.48	1.82	4.02	4.50
Butter	3.13	0.11	3.32	4.20
Milk sugar	4.77	6.08	5.28	5.00
Saline matter	0.60	.34	.58	.68
Water	87.02	91.65	86.80	85.62
	100.00	100.00	100.00	100.00

From the above it will be seen that asses' milk contains much less butter and cheesy matter, than that of the cow. It is probably this circumstance which, from the most remote times, has recommended it to invalids as a light and easily digested drink.

The richness, or proportion of butter and cheese contained in milk, is well known to depend in a great degree on the food of the animal, the period of gestation, and the time of giving the milk. That taken last from the cow, during the same milking, usually contains much the largest proportion of butter. The experiments of Dr. Thomson, of Glasgow, on the milk-producing properties of different kinds of food, are very interesting. His treatise on the "Food of Animals" should be in the hands of every dairy farmer; for to him it is a matter of the highest importance to understand the cheapest and most effectual mode of feeding animals, so as to produce the greatest quantity of rich milk.

The ordinary temperature of new milk is from 65° to 70°. To the naked eye it seems a pure white liquid; but when viewed through a microscope, an infinite number of minute globules appear, which contain the oily part, or the butter. When the milk is set away in the dairy, these oily particles, being the lightest, gradually rise to the surface, and form the cream. But when milk is exposed to the atmosphere, the *oxygen* absorbed by it slowly changes the milk sugar into what is called *lactic acid.*

This acid causes the casein or curd to coagulate, prevents the further separation of the cream, and the milk becomes sour. The curd of sour milk is always found to contain more or less butter; sometimes as much as two per cent., or one-half the whole quantity contained in the milk. This arises from the fact that the lactic acid is formed before all the buttery particles have had time to rise to the surface. Hence, the longer we can keep milk sweet, the more cream we can obtain. Now it is impossible to prevent the change of the sugar into lactic acid, but we can in some measure counteract its effects, by adding to the milk a substance that will absorb the acid as it is formed. *Carbonate of soda* is the substance which experience has proved best adapted for this purpose. It is perfectly innoxious, and when pure, imparts no disagreeable flavor to the milk or butter. A small quantity, say half a teaspoonful, dissolved in water, and mixed with four quarts of milk, will keep it sweet for four or five days; thus allowing all the buttery globules to rise, and often doubling the quantity of cream. In very warm weather, more than the above quantity of soda is required. In order that the cream or butter may have no unpleasant taste, it is essential that the soda be pure; and especially free from *sulphate of sodium,* (glauber salts,) which it often contains. To test its purity, dissolve a little in water, and then add sufficient vinegar to make it effervesce. Put into this a piece of silver, as a teaspoon, for instance, and if, after remaining a short time, it

retains its bright appearance, you may depend upon the soda as pure; for if it contains the least particle of *sulphur*, the silver will become tarnished.

The souring of the cream is caused by the acid formed in that portion of the milk that adheres to the oily particles; and can be prevented, or rather retarded, by the process above described. Instead of soda, other alkalies, as the *carbonate of magnesia*, or a few drops of *ammonia*, are sometimes used.

From 48 to 72 hours are required completely to separate the cream from the milk. When this takes place, the liquid loses its white color, and acquires a blueish appearance, well known as the characteristic of skimmed milk.

In Italy milk is often preserved for a long time by evaporating it to dryness at a gentle heat. It is then known by the name of *latteina*. As eighty-eight pounds in every hundred of milk is pure water, which escapes during evaporation, we obtain by this process about one pound of dry matter to every four quarts of milk. This can be preserved for any length of time, and when dissolved in water is said to possess all the qualities of most excellent milk. Another simple process, by which milk can be kept sweet for six months or more, is to put it into bottles, which, after being well corked, are set in a vessel of water, and gradually raised to a boiling heat; they are then taken out and set away in a cool place until wanted for use.

Composition of Butter.—Butter is an oleaginous, fatty substance, formed by the union of the oily particles contained in the milk. These exist in the form of minute globules, each of which is inclosed in a thin film, or coating, of a substance resembling casein, which can easily be detected with a microscope. When the temperature of the cream or milk is slightly raised, the fatty globules press towards the surface, break through the delicate covering which envelopes each, and the fat exuding collects together through mutual attraction, and constitutes butter. The same result is attained by beating or violently agitating the cream, as in the ordinary process of churning. In all cases the cream becomes sour before the butter is formed. It is supposed by some that the lactic acid attacks and gradually dissolves the capsules, or envelopes of the oily globules, and as these thin off and burst, the buttery particles run together into a mass. This union is purely mechanical; but a chemical action always takes place in changing the sugar into lactic acid. Thus the cream must either be allowed to stand until it sours, or else it becomes sour during the process of churning. In the latter case it is often necessary to raise it to a higher temperature; and it is sometimes found that to add a little sour milk, or some other acid substance while churning, will hasten the formation of the butter. By churning the cream sweet you obtain butter of a more delicate flavor, but in less quantity. In many places all the milk is churned, under the impression that in this way more butter is obtained than from the cream alone. This cannot be the case when the cream has been properly separated from the milk; and besides, in churning the whole of the milk, it is impossible to separate all the butter, from the difficulty of acting equally upon and keeping in motion so large a body of fluid. In the vicinity of towns, where there is a ready sale for buttermilk, it may perhaps be good economy to churn the whole milk; but in the country, where there is no market for buttermilk, it is undoubtedly the better plan to churn only the cream, while from the skimmed milk a marketable cheese can always be manufactured.

The proportion of cream and butter produced by a given quantity of

milk has been found by Prof. Johnston, as the result of numerous trials, to average as follows:

Milk.		Cream.	Butter.
18 to 21 lbs. / 9 to 11 qts.	yield	4 lbs. / 2 qts.	1 lb.

The proper temperature of cream in churning is about 55°, but when the whole milk is churned, it should be 8° or 10° higher. If it be raised too high, the butter comes quick, but is usually soft and white. This is often the case in warm weather, and the only remedy is to use ice, or to keep the milk in a very cool dairy. To insure good hard butter at all seasons of the year, particular attention should be paid to the temperature of the cream: and on a well-managed dairy farm, ice should always be accessible in summer, by which, even in the hottest weather, the cream can be brought down to the proper temperature.

In churning, the motion should be regular and moderate: slower in warm weather than in cold, that the temperature may be uniform throughout the whole mass. The hardest and finest quality of butter has been obtained after churning at the above temperature (55°) from an hour and a quarter to an hour and a half. The following experiments, made by Mr. Ballantyne, of Edinburgh, will illustrate this. The quantity of cream at each churning was eight gallons:

No.	Temperature. Of the Cream.	Temperature. When Butter came.	Time in churning.	Quantity of Butter per gallon.	Quality of the Butter.
1.	56°	60°	$1\frac{1}{2}$ hours.	2 lbs. 1 oz.	Inferior. White, and softer than No. 2.
2.	52°	56°	2 "	2 " 0 "	The flavor and quality of these two could not be surpassed.
3.	52°	56°	2 "	2 " 0 "	
4.	65°	67°	$\frac{1}{2}$ "	1 " 15 "	Soft. White and milky.
5.	50°	$53\frac{1}{2}$°	3 "	1 " $15\frac{1}{2}$ "	Good—but evidently injured by long churning.
6.	$53\frac{1}{2}$°	$57\frac{1}{2}$°	$1\frac{1}{4}$ "	2 " $\frac{2}{3}$ "	Most excellent—high in flavor and color, and solid as wax.*

It is well known that the food of the cow influences both the quantity and the quality of the butter. When the cow is fed on hay or dry fodder, the butter always comes the hardest: and it is said that the orange carrot fed to milch cows will impart an agreeable flavor, and a rich, yellow color to the butter. But to add the juice of the carrot after the butter is made, as is sometimes done to give it a saleable color, is by no means to be commended, as it introduces an element that promotes its rapid decomposition.

How to preserve Butter sweet.—In the first place, let it be worked as free as possible from the buttermilk. The imperfect manner in which this is done is the principal cause of its becoming rancid so soon.

By analysis, ordinary butter was found to contain:

Water	12.79
Casein	.94
Oil	86.27
	100.00

* See Lectures on Agricultural Chemistry and Geology, by Prof. Jas. F. W. Johnston, p. 556.

Here the water and casein, or curd, mingled with the butter, constituted over 13 per cent., and by fermentation would soon destroy the delicate flavor, and produce rancidity throughout the whole mass.

There is a mode of preserving butter fresh for any length of time in use in India, where, when thus prepared, it is called *ghee.* This is to reduce it to a pure oil by boiling it in an open vessel until all the water is removed, which is shown by the cessation of violent ebullition. The liquid oil is then allowed to stand for a short time, until the curd has subsided, when it is strained into bottles and corked tight. When wanted for use it is gently heated and poured out. It is said that it can thus be preserved for years, and that prepared in this way is the best form to use this substance for sauces.*

In Holstein, where very choice butter is made, they pack it in firkins made of beech-wood, charred on the inside. The firkins, jars, or kegs should in all cases be air-tight, and the butter packed as closely as possible. Then, after sprinkling the top with salt, let a thin layer of powdered charcoal be spread over, the more effectually to exclude the air, and also to absorb those gases the tendency of which is to hasten decomposition. When thus packed, after being properly salted, it will keep sweet for a long time, even in warm climates. The salt should always be of the purest description. Much butter is spoiled from using salt containing *sulphate* or *chloride of lime.* When coarse salt is used, the latter, which adheres to the surface of the crystals, can be removed by pouring upon it a little warm water, and then allowing it to drain off.

It may not perhaps be known to all, that rancid butter can be restored, and rendered sweet by a very simple process. This is to work it thoroughly in cold water, often changed, and after pressing out the water, salt it anew, and add a little sugar, say half an ounce to the pound. It will thus be rendered much more palatable, although it may not entirely recover that delicate flavor peculiar to new and sweet butter, which, once lost, can never be restored.

In conclusion, I need only refer to the fact, that extreme cleanliness is an essential requisite in every thing that pertains to the dairy. Vessels of such materials only should be used to contain the milk as will readily admit of being thoroughly cleansed. The skillful dairy-woman well knows the necessity of washing and *scalding* these every time they are used. A very small quantity of putrescent milk adhering to them will act as a *leaven,* and cause fermentation in any fresh milk exposed to its influence. Cream possesses, in a remarkable degree, the property of absorbing any unpleasant odors that may exist in the atmosphere. The air of the dairy should, therefore, often be renewed, and ever be kept pure and sweet.

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* Experimental Researches on the Food of Animals, by Dr. R. D. Thomson, p. 64.

PHILADELPHIA BUTTER—SWEET-SCENTED VERNAL GRASS.

Philadelphia, *October* 31, 1849.

Sir:—I wish to invite your attention to a subject relating to pasturage and the products of the dairy. It has already been laid before the public, but this so partially and imperfectly, that it will still be found by most persons invested with novelty, and as I believe fraught with important bearings upon agricultural interests.

Philadelphia butter enjoys a widely extended reputation for its peculiarly high yet delicate flavor, well known to all who have had opportunities of tasting it. Good butter produced in this vicinity is always to be found in the Philadelphia market, but it is only during the spring that it possesses in greatest perfection that delicious flavor to which I here particularly refer. This superior flavor, like that distinguishing the Epping and Cambridge butter of the London market, has been very naturally ascribed to something eaten by the cows producing it. But what this *something* is has been a subject for vague speculation, and never yet defined or specified so as to enable persons in other localities to avail themselves of it for the improvement of their own pastures and dairy products.

Extensive observations and many experiments made and continued through many years have convinced me that the proximate source of the high flavor of our Philadelphia May butter is the *sweet-scented vernal grass*, abounding in the old pastures, fields, and meadows of the adjacent counties. Some of the facts and reasons upon which I found this conclusion are the following:

1st. In the dairy region around Philadelphia the sweet-scented vernal grass, with its peculiar vanilla-like fragrance, constitutes the predominant spring herbage on all the pasture fields and meadows left several years unploughed. The longer the pastures have been left unbroken, the greater the proportion of the vernal grass, and the higher the flavor of the butter produced from the cows fed upon them. Many of the meadows and pasture fields have remained ten, twenty, thirty, and more years unbroken by the plough. In such cases the sweet-scented vernal grass affords almost the exclusive spring herbage.

2d. The high flavor continues in the butter during the development of this grass, and invariably declines with the maturing of the seeds, after which the stems become dry and hard, and the cattle push them aside in search of fresher and greener herbage.

3d. The sweet-scented vernal grass is shown by chemical analysis to contain an aromatic essential oil, of which *benzoic acid*, or flowers of benzoin, is the base.

This aromatic principle is abundant, and can be readily obtained by distillation, furnishing a delightful perfume and source of flavor. As the milk of all animals is so very susceptible of acquiring disagreeable tastes from substances eaten, such as garlic, turnips, &c., it is natural to infer that it may likewise be imbued with agreeable flavors, when the proper agents for such a purpose are presented in the food.

4th. That the *benzoic acid* is the principal agent in producing the peculiarly agreeable flavor of butter made from pastures abounding in the sweet-

scented vernal grass, I have rendered probable, if not a demonstrated fact, by several experiments in which the flowers of benzoin given to cows imparted to the butter made from them the characteristic flavor. In such cases 20 or 30 grains of the benzoin were given twice a day, previously dissolved in hot water, which was stirred into some flour or meal, and then mingled with the customary mess. The cows receive not the slightest injury from this or even a much larger quantity of the benzoin.

The sweet-scented vernal grass, called by botanists *anthoxanthum odoratum*, is a native of Europe, from whence, at an early period of our settlement, it has doubtless been introduced into the vicinity of Philadelphia, its seeds having probably been blended with those of other grasses. It has been long naturalized, and now disputes the right of soil with the common green grass, and never yields possession, but becomes more and more predominant until the sod is destroyed by the plough, after which it clings to the borders of the field, along the fences, and hedge-rows. When, after a rotation of grain crops, the ground is left undisturbed by tillage to be again covered with greensward, the vernal grass reappears springing from the old seed left in the earth. Though seldom sown designedly in this part of the United States, it is often sown in England, where it constitutes a part of the growth of most permanent pastures, growing in nearly every kind of soil, but attaining its greatest perfection on the deep and moist, loving shady places, such as the skirts of woods. The sweet odor by which English hay is often distinguished is chiefly derived from an admixture of vernal grass. Although when alone it is not distinguished very highly as a hay grass, still its early growth and hardiness, with the superior nutritive properties of its aftermath, give it high claims in the composition of all permanent pastures. In England it comes into flower about the middle of April, and in southern Pennsylvania about the middle of May, the seed ripening in both countries about the second week in June. It is worthy of remark, that in the moist climate of England this grass continues throwing up flower-stalks till the end of autumn, while in Pennsylvania the efflorescence is confined to spring. As the development of the aromatic qualities is mainly confined to the period of efflorescence, this fact may explain why the period of highest flavor in Philadelphia butter is so limited.

The question might be very naturally asked: If the sweet-scented vernal grass communicates to spring butter the high and delicious flavor we have referred to, why is not this flavor imparted in winter when cows are fed on hay cut from meadows known to contain this grass? The answer I would give is as follows: The principal and almost exclusive hay-grass of our section of country is timothy, which, with red clover frequently combined, matures and is mown long after the sweet-scented vernal grass has dried its stalks and lost its distinguishing fragrance. Could the vernal grass be sown alone, or blended with other grasses maturing at the same time, and the hay all mown at the stage of perfect efflorescence and highest fragrance, there is little doubt that butter made from cows fed upon it would manifest more or less of the fine flavor at other times than in the spring. I think it proper to remark that the milky products of cows fed on pastures where the sweet-scented vernal grass abounds, instead of always possessing a delightful flavor, are sometimes found imbued with a most disagreeable one, proceeding generally from weeds so often existing in pastures. In southern Pennsylvania, garlic, and especially that nauseous and troublesome plant commonly called the "ox-eye-daisy," a species of wild camomile,

(*Chrysanthemum leucanthemum*,) are very often nipped by cows when the herbage is short or scarce. In such cases all the agreeable qualities that might otherwise have been derived from the vernal grass are not only neutralized, but overpowered by the disagreeable tastes imparted by the bad company with which it is associated. I consider the sweet-scented vernal grass worthy the attention of all farmers desirous of possessing the means of obtaining butter and other dairy products in the highest perfection, and of having in their fields and meadows one of the earliest, if not the very earliest pasture grass known.

But to these advantages, great as they are, may, I think, be added others of no small importance; one of which is the capacity to confer a fine flavor upon the meat of stock grazed upon a species of herbage fraught with a high aromatic principle. Such advantages have, from time immemorial, been the inheritance of people in certain localities, where they were originally indebted for them to chance, as for example with those residing in the vicinity of Philadelphia, few if any of whom are aware that there exists in their pastures any grasses not common to those of other places. To identify the immediate agent from which such advantages are derived, is to remove them from the uncertain control of accident, and place them at once at the disposal of all.

A description of the grass, the merits of which I have been describing to you, may be found in the Farmers' Encyclopedia, (Philadelphia edition for 1850,) under the head of *Anthoxanthum Odoratum*, figured in plate 6, *a*.

Very respectfully,

Your ob't servant,

G. EMERSON.

HON. THOMAS EWBANK,

Commissioner of Patents.

DAIRIES.

(From the Trans. of New York State Agricultural Society for 1849.)

Committee—B. P. JOHNSON, JOSEPH CAREY.

THE importance of the dairy interest is every year becoming more and more apparent, and increased numbers of our farmers are turning their attention to it. It has been the object of the society to perfect the manufacture of butter and cheese, and thus secure to our dairymen, not only the highest price for their products, but the best markets in our own country and in foreign lands. The committee, from the information they have obtained from various portions of our State, from the most intelligent as well as the most successful dairymen, are satisfied that the laudable objects of the society have, in a measure at least, been accomplished. The quality of butter and cheese is yearly improving, and although very many of our dairymen are sadly deficient, yet the fact that every year witnesses an addition to the number of excellent dairies is in the highest degree encouraging, and should stimulate the society to continue and extend their efforts in this direction. The *keeping* qualities of much of our butter have been established, so that the purchaser is no longer compelled to make his selection from a *single locality*, but has the choice of hundreds of dairies, from which

he may select his butter, that will stand the test of climate. It is in the highest degree inexpedient to send inferior butter or cheese to foreign markets. Loss to the shipper is invariably the result. The inferior butter sent from this country to England is classed as grease, and brings no higher price than what its designation implies, while butter made as it should be commands a remunerating price. So also with cheese.

Our best Herkimer dairies, whose character is as well known in the London and Liverpool market as in New York, will command within a few shillings sterling the price of the best English dairies, and frequently the same price, while inferior cheese is sold from ten to fifteen shillings sterling per 100 lbs. less. But this is true not only of the foreign market: a difference to nearly the same extent exists here, and the poor and indifferent article sells at a very diminished rate from that made in prime and choice dairies. It is then important to press upon our dairymen the necessity of care and attention in the preparation of their butter and cheese. There is no inherent difficulty in producing a good article in most parts of this State, and if the requisite knowledge is acquired, and suitable preparations for making secured, the dairymaid need not make an inferior article, and if she does, the fault must rest upon her.

The exhibition at the annual fair, as well as the samples on exhibition at this time, are of such a character as to satisfy the most fastidious; and what has been done in these cases may be done in a thousand others, if the same attention and skill are directed to the object.

The society has endeavored to ascertain the breed of cattle best adapted to the purposes of the dairy, but as yet cannot learn from the competitors that there can be any decision as to particular breeds in this State which are preferable. From an examination of the statements of all the competitors at Syracuse, eleven in number, who referred to their cows, *nine* were of what is called the *native* breed, and *two* mixed more or less with *Durhams* or short-horns. In the trial of five cows for thirty successive days, it will be seen, Mr. Holbert's five cows made, in thirty days, from 23d May to 21st June, 264½ lbs. of butter, averaging over 1¾ lbs. per day each. His cows were native, with a slight mixture of Durham—what proportion is not stated. Mr. Nelson Van Ness, of Westfield, made 221 lbs. in thirty successive days, averaging nearly 1½ lbs. each per day. His cows are stated to be the common native breed. The only trial which has been made in this State with pure short-horn cows, as to their dairy qualities, which has come to our knowledge, was made by George Vail, Esq., in 1844. He had six cows, from whose milk, in thirty successive days, he made 262 lbs. 9 oz., averaging 43 lbs. 12 oz. per cow—not quite 1½ lbs. per day. One of the cows, whose milk was kept separate, made 52 lbs. 9 oz. of butter, being 1⅞ lbs. per day. Mr. Vail has continued the manufacture of butter from his herd of short-horns since that time, and we believe with satisfactory results.

As a matter of interest, doubtless, to many, we give a statement of the quantity of milk and butter from some of the most celebrated dairy cows. There are few persons conversant with our agricultural journals, but what have heard of the celebrated Cramp cow, owned in Lewes, England, of the Sussex breed, which, during four years, from 1805 to the end of 1808, yielded the extraordinary amount of 23,559 quarts of milk, producing 2132 lbs. of butter! The largest average product which has been stated by any writer in whose practical experience confidence can be placed, is that of Mr. Airon, who rates the yearly average return of the best Kyloes at 4000

quarts within 300 days, or until they were dry.—(*British Husbandry*, vol. 2, page 403.)

First 50 days, 24 quarts per day	1,200
Second " 20 " "	1,000
Third " 14 " "	700
Fourth " 8 " "	400
Fifth " 8 " "	400
Sixth " 6 " "	300

He cites an extensive Ayrshire dairyman, who says: "that he would not keep a cow on his farm that did not yield her own value, or her weight in sweet-milk cheese every year." He admits, however, "that many cows will not yield more than half that quantity—4000 quarts: and that probably 600 gallons in the course of a year may be about a fair average of the Ayrshire stock."—(*Survey of Ayrshire*, p. 464.) The average quantity of milk yielded by dairy cows in England is stated, in three counties, as follows:

In Devon	12 quarts per day.
Cheshire	8 quarts per day.
Lancashire	8 to 9 quarts per day.

Five short-horn cows, of the ordinary quality of that breed, are stated to have given in one year as follows:

One which did not go dry at all	4,857 wine qts.
One dry eight weeks	3,985
One dry four weeks	3,987
One dry four weeks	3,695
One dry eighteen weeks	3,383

These cows were in summer at grass, and in winter on hay and turnips, with two months on hay alone.

"A large dairy of long-horns and short-horns, at the late Mr. Curwen's farm, of Workington Hall, gave upon an average of four years, about 3700 quarts each."—(*Survey of Lancashire*, p. 547.) In some trials made at Bradly Hall, the seat of the Earl of Chesterfield, in Derbyshire, it was found that during the height of the season the milk and butter produced per day by different cows was as follows:—

By the Holderness	7 galls.	1 qt.	38½ oz. butter.
" Ayrshire	5 "		34 "
" Alderney	4 "	3 qts.	25 "
" Devon	4 "	1 pt.	28 "

But this only lasts for a short time, and such extraordinary supplies soon fall off; in fact, the nature of the land, the oldness of the pasture, the age of the stock, and the state of the season, have each a separate influence. Generally speaking, a fair annual product from each cow in good condition may be considered as about 160 to 180 lbs. of butter of superior quality, and 350 to 400 lbs. of whole milk cheese, with a small quantity of whey butter.—(*British Husbandry*, vol. ii. p. 406.)

The most productive cow in butter the late Mr. Colman found in Great Britain, was a *North Devon cow*, which produced for several weeks in succession 21 lbs. of butter per week, without extra feed. The North Devon cows of Lord Leicester's tenant, Mr. Bloomfield, average 4 lbs. of butter

per week through the year, = 208 lbs.—(*Col. Tour*, vol. ii. p. 324.) Among the most extraordinary cows in this country, we give the following from Massachusetts, which we take from the Report of the Committee on the Dairy in Essex Co., 1849.

Date.	Name.	Place.	Weekly Produce.	Length of time.
1826	Oakes cow	Danvers	16 lbs	16 weeks.
1824	Nourse "	"	14 "	16 "
1828	Sanderson	Waltham	14 "	16 "
1830	Homers	Bedford	14 "	12 "
1830	Hazeltine	Haverhill	14 "	12 "
1830	Bassett	Northampton	15 "	12 "
1845	Buxton	Danvers	16 "	12 "

These cows show a product of more than two pounds per day each, for a period of three months. John Hare Powell, of Pennsylvania, had a short-horn cow which produced in 3 days 8 lbs. 13 oz. butter, or at the rate of $20\frac{1}{2}$ lbs. per week.

We give the amount of butter made from several cows in this State:—

George Kier, East Bloomfield, Ontario Co., from his native cow, 19 lbs one week, and 16 lbs. for two succeeding weeks.

Franklin Comstock, of Kirkland, Oneida Co., $\frac{3}{4}$ native, $\frac{1}{4}$ Durham, ten-year old cow, made 17 lbs. 5 oz. butter in one week.

C. W. Taylor, Truxton, Cortland Co., 58 lbs. 6 oz. butter in 4 weeks, about 14 lbs. 6 oz. per week.

Charles D. Miller, of Peterboro', Madison Co., made in one week from a cow of his, $20\frac{1}{2}$ lbs. of butter; and in a very unfavorable week in June, 15 lbs. This cow was an enormous feeder. Her milk weighed at night has been found to average 34 lbs.

John Lossing, Albany; a short-horn cow, in 7 days made 14 lbs. of butter, besides the milk and cream for a family of 5 persons.

Philip Van Benscoten, of La Grange, Dutchess Co., in 1844, from 5 cows in 30 days made 227 lbs. of butter, averaging 45 lbs. 6 oz. to each cow.

George A. Mason, of Jordon, Onondaga Co., in 30 days made $67\frac{1}{2}$ lbs. of butter from the milk of one cow; during the first 14 days, the average was $2\frac{1}{2}$ lbs. per day, and it is believed it would have continued the same during the trial had not the weather proved unfavorable.

P. H. Schenck, of Matteawan, Dutchess Co., made 15 lbs. of butter per week from a polled cow. In 21 days he made $65\frac{1}{2}$ lbs. of butter, or upwards of $2\frac{1}{2}$ lbs. per day; and on one day, from $15\frac{1}{2}$ quarts of milk he made 3 lbs. 8 oz. of butter.

This list might be extended much further; but it is sufficient for our present purpose. By a reference to the census of 1845, it will be found that the average product of dairy cows in this State, as returned, was, by estimation, in butter about 90 lbs. per cow, and cheese about 110 lbs. By reference to the Transactions of the Society, 1846, p. 130, it will be seen that the average product of one dairy in Herkimer was 650 lbs. cheese per cow, for three successive years; and many dairies, in that and other counties, now average, it is believed, 500 lbs. per cow. The average amount of butter from Mr. Clapp's dairy, it will be seen, is 170 lbs. per cow, and several counties are reported in the county reports, exceeding 200 lbs. From

a comparison of the yield of butter from particular cows, and the general estimate for the State, it is apparent that our dairymen have much yet to do, to obtain what they should from their dairies. But we are satisfied that there is an advance making each year, from the information we are receiving from different dairy districts in our State, as well as from our own observation.

The *Ayrshire* breed of cattle have long had a reputation as to their superiority for the dairy, and as this breed is introduced to some extent in this and other States, it is believed that an account of the breed, and some observations on the proper management of cows intended for the dairy, as well as on dairy husbandry generally, will be useful. The remarks which follow are from an article by William Aiton, of Strathaven, Scotland, published in 1812. Mr. Aiton is quoted by English writers as entirely reliable authority.

"The dairy is suited to every species of land, (in Scotland,) except wastes that are not reclaimable. Of dairy animals: there is a degree of pliancy in animal economy, which renders many of them capable of being wonderfully changed by human industry; and that pliancy is not more conspicuous in any animal than the cow; the varieties of which, with their diversities of shape, sizes, dispositions, and capacities, are truly wonderful. The *Urus*, of Lithunia, is nearly as large as the elephant, while the *Kyloes*, of some of the Highland districts, and islands, are not much larger than the goat. The *Bison* has a mane like a lion, a beard like a goat, and a hump like the camel; but all these are laid aside when the animal is domesticated. Domestication and treatment produce change no less surprising in the dispositions of these animals. Our dairy cows are so feeble and over-fed, that they are injured by travelling even slowly, half a mile to their pasture; while those of the Tartars are used for the saddle, and in drawing carriages. These are not so many different species, but merely varieties in the breed of the same animal; and the diversity of size, shape, quality, and dispositions, are the effect of climate, rearing, and treatment. If such changes have already been made, what may not yet be effected? If a savage animal, dressed in the wild insignia of nature, has been by human industry formed into so many varieties, differing so much in aspect, size, and qualities, and fit to be converted into so many different uses, what may not yet be effected on that animal by the sagacity and industry of man? The following well-known adage, of great antiquity, respecting Ayrshire, shows that Cunningham was celebrated for making butter and cheese long before the reign of any of the Stuarts. The adage is—

Kyle for a man,
Carrick for a cow,
Cunningham for butter and cheese, and
Galloway for woo'.

"From the adage above quoted, it would appear that the particular boast of Carrick in remote times was their cows; these, however, were not of the dairy kind, but of what are now termed the Galloway breed. The dairy cows were not introduced into Carrick until 1790.

"The dairy breed of cows in the county of Ayr, having obtained a degree of celebrity beyond any in North Britain, it is desirable to trace their origin. I am old enough to remember that between 1760 and 1770, nothing of the shape or color of the present breed was to be met with in the district of

Cunningham. Some of the red or brown color might then be seen, but nine out of every ten cows in that district were at that time black; hence, all description of cows in Ayrshire were then termed 'black cattle.' The cows of that part of Ayrshire were then generally from twelve to fifteen, and few of them more than eighteen stone weight of saleable meat, when fattened, of 24 ounces to the pound. Being driven round their bare leys in summer, with horses, sheep, and young cattle, and getting no other food in winter but a scanty supply of oat-straw, with what they could collect in the fields, they had the aspect of starvelings; large, high standing horns, with deep ringlets at their roots; their hair coarse, and standing up; their skin thick, and adhering to the bones; their bones large, bodies lank; few of them yielding more than two, or at most three, Scotch pints of milk per day.

"This starveling breed of cows in Ayrshire, in the last forty years, has been gradually, and as it were imperceptibly, changed into something very different in point of size, shape, qualities, and general aspect. But though an eye-witness of the progress of that important change, and recently have made all possible inquiry, I am not able to account for it, otherwise than by greater attention to crossing, rearing, and feeding. Some have alleged, that the dairy breed of Ayrshire has come from Holland, and others have ascribed to them an English origin. I have no doubt but a tinge of foreign blood may have come into their veins; but I am confident that the breed is chiefly indigenous, and that the principal improvement upon that breed has been by better feeding and treatment. The Earl of Marchmont, about the year 1750, purchased from the Bishop of Durham several cows and a bull of the Teeswater, or some other English breed of the *same brown color*, into which the dairy stock of Ayrshire has since been changed. These were crossed with the stock of many farmers. Several cows of a brown color were introduced by gentlemen and noblemen into Ayrshire, at about the same period, from Glasgow. They were of greater size than the native breed of Scotland, and some of these having, from time to time, been carried into different parts of the county of Ayr, and being generally placed on richer pasture, and better fed than the ordinary farm stock were at that time, they yielded a greater quantity of milk, and the farmers became eager to procure calves or crosses with them, in hopes of getting similar returns from their progeny. I have not been fully satisfied as to the origin of this stranger breed; they were termed Dutch cows by some, and English cows by others. But from whatever quarter they may have come, it is from them that the brown color, now so universal in the Ayrshire dairy breed, has become fashionable. Perhaps something of the other qualities of that breed may also have descended to the Ayrshire dairy cows, by crossing with them. But I am not of opinion that the present stock of Ayrshire are either completely descended, or that their superior excellence has been entirely derived from these strangers. I am persuaded that they have been brought to their improved state chiefly by better feeding and treatment.

"As the dairy has been the great boast of Cunningham (the northern district of Ayrshire) from time immemorial, the inhabitants could not fail to discover that some of their cows yielded more milk than others. When one excelled in milking, they would look well for others of the same shape and aspect, and reject those that were different. They would naturally rear the calves of the best milkers, in hopes of their inheriting the qualities of their dams. This and better feeding would improve their stock, and their suc-

cess would stimulate them to make still greater exertions to render their cattle better and more productive. Such improvements, once begun on sound principles, could not fail to lead to most beneficial results. To procure more milk, they select the cow that they find to be most productive of that fluid, and greatly better her condition. By these means the stock is improved, and by experience and observation the farmers acquire more correct notions of the breed, and in what manner they can be rendered still more productive. It has been greatly more by these means than by importing a foreign breed, that the dairy stock of Ayrshire have attained their present unrivalled celebrity; and the farmers having become familiar with the pliancy of the animal, and the proper means of improving and rendering it productive, they will no doubt persevere in making still greater improvements.

"The shapes most approved in the dairy breed are as follows: *Head* small, but rather long and narrow at the muzzle; the *eye* small, but quick and lively; the *horns* small, clear, bended, and their roots at considerable distance from each other; *neck* long and slender, tapering towards the head, with little loose skin hanging below; *shoulders*, thin; *fore-quarters*, light and thin; *hind-quarters*, large and capacious; *back* straight, broad behind, and joints of the chine rather loose and open; *carcase* deep, and the *pelvis* capacious, and wide over the hips, with fleshy buttocks; *tails*, long and small; *legs*, small and short, with firm joints; *udder*, capacious, broad, and square; stretching forward, and neither fleshy, low hung, nor loose; the *milk* veins, large and prominent; *teats*, short, pointing outwards, and at considerable distance from each other; *skin*, thin and loose; *hair*, soft and woolly; the head, bones, horns, and all parts of least value, small, and the general figure compact and well proportioned."—(*Farmer's Mag. and Mr. Aiton.*)

"The *qualities* of a dairy cow are of still greater importance than her shape. Firmness and docility of temper greatly enhance the value of a milch cow: one that is quiet and contented feeds at her ease, does not break over fences, or injure other cattle, so much as those that are of a turbulent cast. To render them docile, they ought to be gently treated, frequently handled when young, and never hunted with dogs, beat, or frightened. A moderate degree of hardiness, life, and spirits, with a sound constitution, are desirable qualities in a dairy stock, and all these are found in the Ayrshire. Some have mentioned it as a valuable quality when a cow subsists on a small portion of food; but that will depend upon the quantity of milk which one so fed will yield. If any cow gives much milk on little food, it is one of the best qualities she can possess; but of this I entertain doubts, which forty years' experience, inquiry, and observation, have served to corroborate and confirm. I have heard it asserted that some cows will yield as much milk, and fatten as fast, when fed on coarse, as others will on rich food, but I never met with, nor do I ever expect to see, such cows. The old adage, so common in Ayrshire, that 'a cow gives her milk by the mou',' has always held good, so far as I could perceive. It is of the greatest importance for dairy cows to be fed, from their earliest days, on food that has a tendency to produce the milky secretion, and even to be fed on that description of food when not giving milk. It was common in former times to rear young cows for the dairy on moors and heathy ground, and only to lay them on better pastures and dairy food when they came into milk; but this has been found to be an improper mode of rearing a dairy stock, and they now fare much better in their youth than they did in former times. When young

cows of the dairy breed are reared on moors or bad pasture, and get only as much fodder as keeps them alive, they grow up what in Ayrshire is termed '*a rough beast*,' with large horns, coarse hair, thick skin, high bones, and other marks of a starveling, and they *never after become good milkers*. But when they are fed on better pasture and provided with some green food, and good fodder during the winter, they grow up proper dairy cows, having the shapes and good qualities that have been enumerated. In former times, no other attention was paid to the dairy stock during the winter but to keep them alive. They were fed on the worst and coarsest of oat-straw, or ill-preserved bog hay, cut from the marsh meadows and frequently half rotted in drying. The consequences were that the dairy cows went out to grass in May mere ghosts, lean, weak, and meagre, with their milk vessels dried up. Hence the summer was far advanced before the cows either gave much milk, or that which was of good quality. A lean, starved cow never gives so much nor so good milk as one that is in proper habit of body. [How true a description is the above of too many dairies in the State of New York, and how many have yet to learn that no other animals give a better return for kind care and good keeping, winter and summer, than the dairy cow! Attention to the cows winter and summer, as they should be cared for, would add alone to every dairy in the State, where neglect has heretofore prevailed, at least fifty per cent. more butter or cheese than the amount now realized.]

"Some think it is needless to give cows milky food when they are not in milk. I met some years ago with a clergyman attending the funeral of one of his parishioners, mounted on a large, meagre, lean horse, and laboring hard with *staff* and *spur* to keep up with the procession. On a relative of the deceased urging him to accompany the funeral to the grave, he said he meant to have done so, but found his horse could not travel, which was surprising, as he had given him *three measures of grain that morning*. Some person expressed a doubt that the horse had gotten as much every day. The clergyman said he had no grain since the last time he rode, *about three weeks before*.

"Too many farmers treat their dairy cows on the same principle as this worthy divine did his horse; give them no milky food when *yell*.* But those who do so will find their cows as incapable of giving good milk after they calve, as the clergyman's horse was to travel, even when he had got *three measures of grain that morning*.

"Even young cows intended for the dairy ought to be fed from the time they are calves on food suitable for milch cows, and treated nearly as their dams. Such food and treatment have the greatest tendency to form the milk vessels of the young cows, and rear them with dairy qualities; and when they come into milk after being so formed, they will produce the most copious secretion of the milky fluid. It is by such treatment that a calf is formed into a dairy cow, and those who wish to rear and keep a dairy breed in any thing like perfection, must provide them with an abundance of such food as is suited to the production of milk; and they must supply them with such food at all periods of their existence; when they are young, when they are full grown, when they are in milk, and when they are *yell*."

The suggestions of Mr. Aiton as to the management of dairy cows are worthy of attention, showing, as they do, that a first-rate uniform dairy

* This term is used in Scotland for cows that are not in milk.

stock may be secured, if care and attention is given to the selection of animals from which to breed. Bakewell obtained an improved breed of cattle and of sheep, entirely superior to either of those from which he bred, by pursuing a systematic course. In what manner has the short-horn breed of cattle been brought to their present state of perfection, especially as regards their early maturity for beef? The attention which has been given in the selection of animals from which to breed, possessed of the desired qualities, has brought about the result sought for in this breed; and while like care is continued the same qualities will be perpetuated.

Mr. Colman, in his Tour, says: "The great law that like produces like, though it is not invariable, is comparatively of universal operation. Good qualities are propagated by the union of animals possessing good qualities; and defects, and faults, and infirmities, are in like manner extended and aggravated." The perfecting a breed of dairy cows in this country, we are aware, must be the work of time, and requiring much judgment and skill; but that is no sufficient reason why it should not be done. The end to be secured is one of sufficient importance to justify no inconsiderable outlay, and no small amount of time and labor. Until this is done, the yield of our dairies will continue far less than it should be, and consequently a diminution in profit, much more than is desirable for a farmer to sustain.

Mr. Moses Eames, president of the Jefferson Co. Agricultural Society, in speaking on this subject, the improvement of dairy cows, says: "We should deem it an easy matter to add twenty-five per cent. to the dairies of this county, clear of all expenditure of time and money, by improving the qualities of the cows. It is believed there is no dairy in the county consisting of ten cows or more, which does not show a difference of one-third in the yield of milk from the best to the poorest cow in the yard, yet the same amount of food is consumed by the poorest as by the best." (Report Jeff. Co.)

Mr. A. L. Fish, of Herkimer Co., a dairyman of much experience and observation, says: "A low estimate made from the census taken in 1845, gave the value of the milk product of this State at that time to be forty millions of dollars. The census to be taken in 1850 will doubtless show an increase to fifty millions. If suitable care was taken with the feeding and housing of milch cows throughout the State, it would no doubt increase the amount ten per cent; and much more might soon be added, if proper attention was given to the heifers designed for milkers. I am fully convinced that a proper adaptation of food, with thorough and continued milking, would much improve the milking habits of the cow. It cannot be doubted; I think, that a judicious course in the selection of heifers, and feeding and training them as milkers, will do much towards establishing milking habits, and the object is well worthy the attention of breeders, and a liberal premium for the most successful experiment in this direction, would be worthy of the Society, and would, I should hope, lead to the successful accomplishment of the object."

There is another subject connected with the dairy interest, to which it seems desirable to direct the attention of those engaged in this branch of husbandry. It is well understood by all good farmers, that continued cultivation and cropping of land will soon diminish its fertilizing qualities, rendering necessary a judicious application of manures to restore the exhaustion caused by the crops grown. It has appeared to us that probably our grazing lands, which are solely devoted to that object, will ere

long begin to give indications of a failure to supply that kind of nutriment which is best adapted to the healthfulness of the cow, and to the secretions calculated to furnish the requisite quality of milk. The phosphates, so important and necessary for the milch cow, and which are carried off so largely from the pastures, in the milk, will need to be returned. This has been the case in Cheshire, in England, which has been a dairy region from the earliest period of English history, and bones and bone-dust have been long used there as indispensably necessary to restore the waste made by the animals fed upon the pastures. The following extract from an article in the Edinburgh Review, in relation to Cheshire, shows more particularly the result:

"Dairy husbandry has long prevailed in Cheshire. Now it has been ascertained that every milch cow robs the land annually of as much phosphate of lime as is present in eighty-two pounds of bone-dust. From being thus gradually despoiled of this valuable mineral, the Cheshire pastures have become less rich in nutritious herbage; and hence the peculiar benefit derived from boning them, a practice now so extensively and profitably introduced."

Dickson, in his work on agriculture, published fifty years since, remarks, "that the manuring of pasture lands is much less in practice than ought to be the case, as where the soil is not good, and is kept in a constant state of feeding and pasturage, it would seem probable that the fertility must in some measure decline, if proper means be not taken to preserve and keep it up, even though they should be fed down with sheep, which is unquestionably in this view the most favorable sort of stock. It is indeed hardly to be supposed that the small proportion of excrementitious matter that is dropped at random during the feeding of the animals, especially the larger kinds, under an exposure to the dissipating and wasting effects of the atmosphere at different seasons, where no other sort of food than that of the natural grasses of the pastures is consumed, can in such sorts of land be adequate to the restoration of the great degree of fertility that is constantly conveyed away in the time of pasturing. In the better kinds of pasture lands where the produce of the grass is considerable, improvement may, and undoubtedly does, take place by feeding them, especially by sheep, as the discharges of the animals are not only more abundant, but a proportion of old grass is left to decay during the winter season, and in that way makes an annual addition to their fertility. It appears probable to us, however it may differ from opinions that have been held on this subject by some cultivators, from much close attention to the management of grass lands of the less rich kinds, in state of pasture, that in such cases, unless attention be paid to improve their condition by some other means than merely that of the manure dispersed over the land by the animals in simply consuming the herbage, they must in time become gradually deteriorated and the quantity of pasture be lessened so as to support smaller proportions of stock than was formerly the case. This supposition seems, indeed, in some degree supported by the condition of the downs, and other uninclosed lands that have been in a state of pasturage for a great length of time; as in these cases if feeding had rendered them more fertile, they must long since have been enabled to carry a vastly increased proportion of stock, which is certainly not the case. That feeding down lands in a judicious manner has the effect of rendering the herbage more fine, and better for the support of stock in general, there cannot be the slightest doubt; but it

does not certainly follow that the fertility of land in such cases as has been just mentioned, is thereby really improved, as has been supposed by some employed in grazing. It seems not improbable but that the bettering of the condition of the herbage by feeding the lands with sheep, may have occasionally led to the supposition that the fertility of the grounds was thereby, in *all* cases, really improved. Though immediate improvement of the fertility of pasture grounds may be effected in different ways: as either by the direct application of manure in its natural state, (such as that of rotten dung, lime, marl, or in that of earthy compost,) occasionally over their surfaces in a thin, even manner; or indirectly by the folding or confining of sheep upon the land during the time they consume other sorts of green food. The latter mode is unquestionably the most advantageous and convenient, as it is in but very few situations that the former can be practiced without injury to the arable or hay lands. By proper attention in this way, the more poor pasture grounds might soon, and at little expense, be brought into a good state of pasturage."

Prof. Johnston, in the 2d edition of his lectures, page 1067, in relation to the manure from the droppings of the milch cow, says:—The *milk cow* exhausts still farther the food it eats. In the lean milk cow which has little muscle or fat to waste away, and therefore little to repair, the sustaining food is reduced to the smallest possible quantity. This small portion of food is all that is returned to the husbandman in her dung. The phosphates, salt, and gluten, and even the starch of the remainder of the food she eats, are transformed in her system, and appear again in the form of milk. The dung of the milk cow must be very much poorer and less valuable, compared with the food she eats, than any kind of stock."

"It is true that the bulk of her dung may not be very much less than that of a full grown animal which is yielding no milk: but this bulk is made up chiefly of the indigestible, woody fibre, and other comparatively useless substances which her bulky food contains. The ingredients of the milk have been separated from these other substances as the food passed through her body, and hence, though bulky, the dung of the milk cow is colder and less to be esteemed than that of the dry cow or of the full grown ox."

It will be obvious from the above remarks, that the droppings of the cow, inferior in quality as a manure, cannot for a great length of time answer the purpose of keeping the land in the proper condition, and that a resort eventually must be made to other manures to restore the substances exhausted. Natural pastures have peculiar grasses, which give a succession of rich and succulent herbage during the season. In case of artificial pastures, this seldom or never occurs. Sir George Sinclair states, "that the different grasses of the richest natural pastures in England are 26 in number," and "that from the spring to the end of autumn, there is not a month that does not constitute the particular season of luxuriance in one or more of these grasses." Whether the varieties of grasses in our natural pasture lands are as numerous as in England, we are not informed: but we have often heard from dairymen that no pasturage gives as sweet butter as the natural pastures, and so far as we have experience, we believe this is true. If this is so, then the importance of so managing the lands as to keep up these pastures, and prevent the necessity of a course of grain crops to restore fertility, must be obvious. Professor Johnston, in his lectures, says, "Dairy husbandry produces a special exhaustion of the soil;

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and knowing this and what substances have been taken out of the soil and carried off in the shape of milk, we know what to put in to reclaim it."

We desire to call the attention of dairymen to this matter, and trust that they will communicate the results of their own experience and observation, and give such suggestions as may be important in relation to the subject.

Butter Dairies.—There were submitted for premiums two applications—one from Horace Clapp, of Houseville, Lewis Co., the other from John Holbert, Chemung Co.

Mr. Holbert's dairy is well known, the first premium of the society having been heretofore awarded to it, and its high character is still maintained. The management of his dairy is fully described in Transactions, 1848, page 269. During the past season he has had 38 cows: has made 5.403 lbs. of butter, averaging 142 lbs. per cow. Sold pork, fattened on buttermilk and corn, 4.142 lbs.; reserved for family use 1.200 lbs. Butter sold in New York for 22 cents per lb. The season in Chemung has been unusually dry, and Mr. Holbert's pastures have been seriously affected by the drought.

Statement of Horace Clapp.—Farm located in Turin, Lewis Co. Three-fourths of it upland. Latitude 43½°. Farm contains 200 acres under cultivation, 125 acres in pasture, 50 acres in meadow. Soil, loam. White clover for pasture, timothy for hay. My meadows are top-dressed in the fall, with muck, (or common earth,) mixed with manure in equal parts, thirty loads to the acre. Average of hay from 1½ to 2 tons per acre. Commence making butter 15th April, close 15th December. Average quantity of milk per cow during the season, 12 lbs. per day, from the whole herd, 480 lbs.: 5½ lbs. of butter to 100 lbs. of milk. Quantity of milk during the season from the whole herd, 115.200 lbs. Average quantity of butter per cow for the last ten years, from 165 to 180 lbs.: quantity made last season, 6.800 lbs. Rear no calves: generally keep swine, one to four cows. No feed (usually) except grass and hay.

Treatment of Milk and Cream.—Milk strained into pans, stands from 30 to 48 hours, (as the weather may require.) Cream put into a tin cooler, made expressly for the purpose: kept cool and sweet with ice. Churn every day.

Mode of Churning.—Use two churns, each containing 90 gallons: part of the season I churn a good share of the milk by water power; the churn used for cream is one of my own invention, has a tin inside, with a space of four inches between the tin and the wood, to receive water and ice while churning. Temperature 50°. Churn from 50 to 100 lbs.

Mode of making Butter.—It is taken from the churn with a ladle and put into a wooden machine or brake to extract the milk from the butter *without washing*, salted and placed on ice for twelve hours, then worked the second time, and packed in a tub. Use a refrigerator to keep the ice and butter before packing in the tub, and to keep the butter *clean*. (Great care should be taken that the butter is not overworked, so as to injure the grain.) Use Bonaire ground salt, 5 to 6 lbs. to the 100 lbs. of butter. No other substances used. The butter from the dairy has been sold in Boston for the last ten years at 23 cents per lb. Milk room 30 by 24, in basement three sides under ground, with free circulation of air. Milk set upon stone.

No. of cows, 40; breed from ⅛ to ¼ Durham cross with native. Cows calve from 1st to 15th April. The difference in the milk of different cows in the extreme is ½, average ¼ between those giving the best milk and those

inferior. White clover pasture produces the most and best milk. Cows fed in one pasture, which is deemed preferable to change of pasture, with a full supply of running water, and free access to salt, kept in a close trough at all times. It requires from 3½ to 4 acres of land to keep a cow *in good condition* through the year.

Remarks.—The principal cause of poor butter is attributed to the following errors, viz.: 1st. For want of a proper place, cool and airy, to keep the milk. 2d. Want of neatness throughout the entire dairy. 3d. Want of strict attention. 4th. Suffering milk to stand too long before it is skimmed. 5th. Cream not kept sufficiently cool, and standing too long before it is churned, consequently the butter soft, sour, and worthless, and unfit for use by any who like good butter.

HORACE CLAPP.

Affirmed before me, by Horace Clapp, that the facts set forth in the foregoing statements are true to the best of his knowledge.

NATHAN NICHOLS, *Justice of the Peace.*

The committee award the first premium of a silver pitcher of the value of $50 to Horace Clapp, Houseville, Lewis Co. The second, a silver cup of the value of $30 to John Holbert, Chemung, Chemung Co.

CULTIVATION OF PEPPERMINT.

ALLOWAY, WAYNE CO., N. Y., *November 28th*, 1849.

DEAR SIR:—I have the honor to acknowledge the receipt of your letter of August 16th, 1849, soliciting information in relation to the cultivation of peppermint as an agricultural product. Minute and careful inquiries of the most important growers of mint in this vicinity, in reference to its culture, extraction of its oil, cost of production, market, &c., have been attended with answers so uniform that I deem the abstract of information on this subject, which I have the pleasure of presenting you, authentic and reliable.

As an agricultural production, the culture of peppermint in the United States is limited to few localities; this county and the adjoining ones, Seneca and Ontario, comprise the largest bed. In the year 1846 about 40,000 lbs. of oil were produced. In Lewis county, in this State, it is grown, though to a less extent; the amount of oil produced there in 1846 was estimated at 4500 lbs. In Michigan about 10,000 lbs. are annually produced; Ohio furnishes about 3000 and Indiana 700 lbs. per annum. The entire crop in the United States, in the year 1846, is estimated in round numbers at 58,000 lbs.

The above comprises all the localities of any importance in the United States, and the above estimates of the annual product of oil were made from correct data for the year 1846, since which time the cultivation of mint has rapidly decreased in consequence of a speculative movement by a New York company, who in the spring of 1847 purchased nearly all the mint then growing in this State, and stipulated with the growers not to raise it for two years thereafter, which condition was generally observed on the part of the growers. The present year (1849) on account of the drought, has not realized the expectations of those engaged in its culture, although the amount

of oil produced is much larger than the product of the two preceding years. In this mint district, 8000 lbs. have been raised; Lewis county furnishes 1000 lbs.; Michigan, 8000 lbs.; Ohio, 1000 lbs., and Indiana 500 lbs. So that the entire crop of 1849 will not materially vary from 18,500 lbs.

I have consulted several of the principal dealers in mint oil, where opportunities have been ample to form a tolerably correct estimate of the amount of oil annually consumed, and their opinion fixes the total consumption, for the various purposes for which it is used in the United States and in Europe, at from 20 to 30,000 lbs. annually.

The price of mint oil is extremely fluctuating. Like other unstaple commodities, the value of which depends upon their scarcity or abundance, it never has assumed a constant and standing value, but its price has generally been deranged by speculation and monopoly. It has happened that the amount of oil produced was for several years greater than the annual consumption, producing an accumulation in the market, and reducing the price to the very low rate of $0.75 per lb.; on the other hand, when the article was scarce it readily sold for $5.25 per lb. The average price for fifteen years has been about $2.50 per lb. This year it readily sells for $1.50.

Peppermint began to be cultivated in this vicinity as an agricultural product about the year 1816, but for several years the want of a proper knowledge of its culture, and the expense and difficulty of extracting the oil, prevented its extension beyond a few growers, who, however, realized fortunes out of the enterprise. Almost any kind of soil that will successfully rear wheat and maize, is adapted to the growth of mint. Rich alluvions, however, seem to be most natural, as would be inferred from the fact that the wild herb is almost uniformly found growing upon the tertiary formations, on the margins of streams. The rich bottom lands along our rivers, and the boundless prairies of the West are eminently adapted to its successful culture. It is believed by those best acquainted with the subject, that its cultivation must be ultimately confined to the western prairies, where it will grow spontaneously, and where the absence of noxious weeds and grasses, incident to all older settled lands, renders the expense of cultivation comparatively light, and where the low price of land will be an important item in the amount of capital employed, the expense of marketing being slight in comparison to that of the more bulky products of agricultural industry.

The method of cultivation is nearly uniform. The mode of propagation is by transplanting the roots, which may be done in Autumn or Spring, though generally the latter, and as the herb is perennial, it does not require replanting till the fourth year. To ensure a good crop and obviate the necessity of extra attendance the first season, the ground intended for planting should be fallowed the preceding summer, though this is not necessary if the land is ordinarily clean. The ground should be prepared as for maize, as soon as possible in the spring, furrowed and roots planted in drills, twenty inches apart, and covered with loose earth, two inches deep, the planter walking upon the drill and treading it firmly. The proper time to procure roots is when the herb is a year old, when from six to eight square rods of ordinary mint will yield a sufficient quantity of roots to plant an acre, and the crop from which the roots are taken will not be deteriorated, but rather benefited by their extraction. As soon as the herb makes its appearance it requires a light dressing with the hoe, care being taken not to disturb the young shoots, many of which have scarcely made their appearance above the ground. In the course of a week or two the crop

requires a more thorough dressing, and at this stage of growth the cultivator may be used with advantage, followed by the hoe, carefully eradicating weeds and grass from the drills, and giving the herb a light dressing of earth. Another dressing a week or two later is all the crop requires.

The two following years no labor is bestowed upon the crop, though it is sometimes benefited by ploughing over the whole surface, very shallow, in the autumn of the second year, and harrowing lightly the following spring, which frequently renews the vigor of the plant and increases the product.

The mint should be cut as soon as it is in full bloom, and the lower leaves become sere; the first crop will not be fit to cut as early as the two succeeding ones. It is then to be hayed and put in cock, and is then ready for distillation.

I have consulted many mint-growers, who have cultivated it for a series of years, in regard to the average yield per acre, and have arrived at the following estimate, which I think is low, provided the land is suitable, and is properly cultivated. I estimate the average yield per acre for the first year at 18 lbs.; the second year at 14 lbs.; and the third year at 8 lbs.—making the product for 3 years 40 lbs., which I think will not materially vary from the actual result, though growers aver they have raised from 30 to 40 lbs. per acre the first season.

Several years since, the only method of extracting the oil then known was by distilling the herb in a copper kettle, or boiler, and condensing in the usual manner; a slow and tedious process, by which about 12 or 15 lbs. of oil could be separated in a day. But recently steam, that powerful agent, which has wrought such immense changes in our social and national economy, has been applied to this subject with its usual attendant success. The present method consists in the use of a common steam-boiler, of the capacity of from 100 to 150 gallons, from which the steam is conveyed by conductors into large wooden air-tight tubs, of 200 gallons capacity, containing the dried herb; from which it is conveyed, charged with the volatile principle of the plant, into a water-vat, containing the condenser. The water collected at the extremity of the condenser, although it does not readily commingle with the oil, is highly tinctured with it, and is used to feed the boiler. Two tubs are necessary, in order that when the "charge" is being worked off in one, the other can be refilled. The oil is then to be filtered, and is ready for market. The expense of a distillery is estimated at $150, which, with the labor of two men, and a cord of dry wood, will run 40 lbs. of oil per day. The usual price for distilling is twenty-five cents per pound.

The cost of production is of course greatly modified by circumstances. If grown on rich bottom lands, or prairie, unusually free from weeds and grass, the labor required will be comparatively trifling. From information derived from the principal mint-growers in this vicinity, I have prepared the following estimate of the cost of production of an acre of mint for three years:—

First Year.

Rent of an acre of land one year	$8.00
1 day plough and drag, 1 hand and team	2.00
½ " furrowing, digging roots, one hand and horse	1.00
3 days planting, at 75 cts.	2.25
2 " dressing with hoe, at 75 cts.	1.50
2 " with cultivator and hoe, 1.00	2.00

2 days with cultivator and hoe (3d dressing)	1.50
$1\frac{1}{2}$ " cutting new mint, at 75 cts.	1.13
Curing and drawing to distillery	1.50
Distilling 18 lbs. oil, at 25 cts.	4.50
Can for oil	25
	$25.63

Second Year.

Rent of an acre of land one year	$8.00
Cutting one acre of old mint	75
Curing and hauling to distillery	1.50
Distilling 14 lbs. oil, at 25 cts.	3.50
Can for oil	25
	$14.00

Third Year.

Rent of an acre of land one year	$8.00
Cutting, curing, &c.	2.25
Distilling 8 lbs. of oil, at 25 cts. and can	2.25
	$12.50
Total expenses for three years	$52.13
Forty pounds of oil, at $1.37½ per lb.	$55.00
Deduct expenses	$52.13
Net profit	$2.87

In the above estimate I have omitted the expense of roots, for the reason that the crop will yield as many as are required for planting. The price of roots is about 50 cents per square rod, and if they are in demand, the profit of the crop will be greatly enhanced by selling them at that, or even a lower price.

It will be readily perceived that the culture of peppermint promises no great return of profit in sections of country where land is valuable, and where the expense of production is nearly double what it is in newly-settled districts. It is a fact that in Michigan, and other Western States, the actual expense of production is about one-half less than the above estimate, and the yield is a fourth greater; the greater distance from market, which is usually New York city, not being taken into account, the freight on oil being comparatively trifling. Another consideration in favor of prairie cultivation is, that the mint will endure for years by simply ploughing over the surface every second year, which seems to invigorate the herb, and obviates the necessity of replanting every second or third year, as must be done in older settled localities.

I have already pursued this subject to a greater length than I intended, but if my efforts to arrive at a correct statement of the subject under consideration shall be the means of imparting any interesting or useful information, my object will be attained.

Yours respectfully,

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PARASITIC FUNGI.

A Lecture, delivered in the City of Norwich, England, at the Annual Meeting of the Royal Agricultural Society, July 18, 1849,

BY REV. EDWARD SIDNEY, A. M.

Gentlemen:—I have no common satisfaction in addressing you in a county where for many years my humble efforts, made long before similar exertions had become at all general, were so favorably received and kindly acknowledged by all classes of persons. I will not, however, indulge myself by any further preface, but proceed at once to the task I have cheerfully undertaken. I shall endeavor to describe in simple, popular language, the nature, habits, and, as far as I can, the preventives or palliatives of the principal *parasitic fungi* of the British farm, beyond which, of course, I cannot go; avoiding all needless technicalities, and stamping my explanations with those characters which will promote their currency with every hearer. Whenever I am obliged to use a scientific term, I shall try to explain it; and I commence by remarking that the epithet *parasitic*, applied to a plant, means that it lives at the cost of that on which it grows. A *fungus* is a cellular plant without flowers, living on air and nourished through a *stalk*, *stem*, or *spawn*, called its *mycelium*. It is propagated by minute seeds, or spores, or sporules, either colorless or not, but never green, and occasionally inclosed in skinny coverings, termed *sporidia*, or spore cases. Fungi live by imbibing juices impregnated with the peculiar principles of the matrix on which they grow. The spores mostly germinate either by a protrusion of the inner membrane, or by a lengthening of the outer covering; and the spawn is the development of these spores, or of itself already produced, possessing the power of imbibing the juices just alluded to. The most familiar example is common mushroom spawn, which the little seeds will sometimes throw out on strips of glass, so as to be well observed. *Fungals* most commonly grow upon animal or vegetable substances in a state of decomposition; but many of the simplest organization attack tissues, in which its commencement is at least not ascertainable, or, if commencing, hasten it beyond recovery. The simplest form of a fungus is common mouldiness, which has two types. The first, as may be seen by the aid of the microscope, is composed of jointed threads made up of simple cells, placed end to end, which separate and seem capable of reproduction. This is represented in Plate 5, fig. 1, where the little cells may be seen placed as described. These cells are capable of being separated, and appear to be reproductive. The second assumes a thread-like appearance, bearing spores upon the tips of the threads, or on short processes, and sometimes in cases, by the rupture of which they are dispersed. They sometimes assume the beautiful appearance delineated in Plate 5, fig. 2, where the jointed threads and the attachment of the spores in the way mentioned will be perceived. The actual forms even of these simplest fungals are thus shown to be extremely interesting. Examples of spores in cases will be pointed out as we proceed. In a higher state, fungi take a determinate figure, formed of a mass of cellular tissue, the centre of which is all spores, attached to it often

in fours. This at length dries up, leaving only the dusty spores, as in the case of a common puff-ball. The most completely formed fungi have two distinct surfaces, one of which is even and without any opening,—the other separated into plates, called the *hymenium*, or *gills*, to which the spores are attached, generally four together, as seen in Plate 2, fig. 3. Upon these differences of structure depend those various attempts at botanical arrangement, which I have no time to describe. So numerous are the seeds, spores, or sporules of fungi, that it is not easy to conceive a place whence they are excluded. Those which grow on matter in which decomposition has decidedly begun, have been well called the "scavengers of nature;" but others of a most minute description, some of which belong to my subject, apparently attack tissues in full health and vigor.

With regard to the properties of fungi, I can only mention in a word that they are respectively *eatable*, *poisonous*, *medicinal*, *intoxicating*, and even *luminous*, lighting up with their living lustre mines and caverns where they grow, and in some places assuming at night the appearance of pendulous lamps hanging from the trees on which they vegetate.

I. I now propose first to describe the chief of those minute parasitic fungi which injure the corn and grasses of this country, premising that corn plants are themselves only grasses, the seeds of which are sufficiently large for our food. These little pests generally present themselves to the unassisted eye under the form of masses of dust, differently colored, and appear on all parts of the plants except the roots. (1.) The stems or straw of our corn plants, and also the leaves, are frequently disfigured by a dark series of patches, constituting true mildew, and called by botanists *puccinia*, from the Greek πύκα, *thickly*, because of the dense masses of which it consists. It is found upon reed as well as corn, but the microscope reveals a slight difference in the structure of the spores, by which the puccinia of one species of plant is distinguishable from that of another. It was imperfectly noticed by Felice Fontana in 1797, but in 1804 was investigated more closely under the auspices of Sir Joseph Banks, on account of its ravages that season, and microscopical drawings, still in the British Museum, were executed by Mr. Bauer. Its common appearance is seen in Plate 5, fig. 4, which represents it on the straw a little magnified. Its appearance under a first-rate modern microscope is shown in Plate 5, fig. 5, where you perceive that these dusty patches are crowds of club-shaped fungi (spores), the thicker end of each of which is divided into two chambers containing the reproductive sporules. They burst through the *epidermis*, or upper skin, which they lift up, and the sporules, dispersed through the air, have been thought to find entrance through the *stomata* or pores. The ground of this notion is, that the patches of mildew are first seen in small cavities immediately beneath these *pores*, which, as Professor Henslow, to whom I am indebted for the specimens now before you, observes, certainly looks very much as if the sporules entered there. With his usual caution, he remarks, that "the fact stands in need of proof, and that hitherto the evidence is more in favor of similar fungi being imbibed by the roots of the plants which they attack." We shall shortly see that some experiments on another fungal parasite of wheat tend to show that these fungi are developed in a manner little suspected even by the most accurate observers. This parasite robs the living plants of their juices, and must not be confounded with a very minute fungus, called *dipazea*, which is peculiar to the joints of the straw; nor, as is more common, with another black fungus, which gives a

dingy aspect to whole fields towards harvest, and is often called mildew, but which never attacks a plant till it is previously diseased, and which, for want of any other name, I am obliged to announce by its botanical one, *Cladosporium herbarum*, the character of its growth being, as you see in Plate 6, fig. 6, totally unlike mildew. It grows on old leather as well as on wheat. The dissimilarity to *puccinia* is visible enough. Spores may be seen here in their cases. The common appearance of the straw, as shown in Plate 6, fig. 7, not being accurately observed, misleads. Though I have no other name but the botanical one by which to call it, I can trace its derivation to the Greek κλαδος, a branch, because the spores grow on minute branches. Whatever tends to preserve the health of the wheat will prevent also the attacks of this fungus.

(2.) We now come to other minute parasitic fungi of corn-plants. They are called *uredines*, the plural of *uredo*, from the Latin *uro*, to burn, on account of the scorched appearance of the parts on which they vegetate. Different parts are attacked by different species: the *uredo* of the maize alone growing everywhere except on the roots. The first *uredo* I shall mention is known familiarly to the farmer as rust, red-rag, red-robin, red-gum, and comes out in yellow or orange blotches on the stem, the leaf, and the chaff-scales, appearing as a powder. The hue of a whole field is often affected by it, and fears naturally arise; but it frequently happens that a few days' bright sunshine dissipates the fungus ; but mischief has been done, and the crop feels it. It is called *uredo rubigo*, and under the microscope the spores appear as in the drawing (Pl. 6, fig. 8). You may observe the spores in the highly magnified diagram, most accurately drawn from the microscope by Mr. Leonard. They are seen growing on the *mycelium*, which finds its matrix in the tissues of the plant. There is a curious botanical question, whether this *uredo* passes to *puccinia*. I think the best evidence confirms the opinion that such is the case.

(3.) The sooty powder on the flowering parts of corn-plants, called smut, chimney-sweepers, and dust-brand, is formed of the spores of another *uredo*, called *uredo segetum*. It renders the whole interior abortive; the pedicle of the flower swells, and a black dust occupies the whole. These spores are so diminutive that the diameter of one is only $\frac{1}{2800}$ inch. Strange to say, some farmers welcome its appearance, because they conceive it augurs a good crop, forgetting that whatever ear it attacks, it makes one less in that crop.

(4.) Another *uredo* called bunt, or pepper-brand, seizes on the grain of wheat, and that to a great extent, if not guarded against. This *uredo* is termed *uredo fetida*, on account of its filthy odor. If you break a grain infected, you will find the flour replaced by a black mass, oily and fetid, and all the ovary is seen to be destroyed, except the integument, which swells, and incloses the spores, amounting in a single grain to nearly four millions. They are, like those of *uredo rubigo*, shown in Pl. 6, fig. 9, on their mycelium, or spawn, and are in diameter about $\frac{1}{600}$ inch. This drawing, also from the pencil of Mr. Leonard, shows the spores perfectly, as they would appear under an achromatic of $\frac{1}{16}$ inch focal length, with an eye-piece of moderate power. This *uredo* confines its attacks chiefly to the seed of wheat among our cereals; but some other plants, as the convolvulus, and of the grasses, rye-grass, bromus, and poa, are subject to have their seeds destroyed in a similar manner.

(5.) These *uredines*, as well as mildew, though till recently not understood, have long been the subjects of observation. Moses threatened the

disobedient Israelites with mildew, and the Romans had their false god *Robigo*, whom they thought to propitiate for the preservation of their fields from the disastrous attack of these diseases. A feast called *Robigalia*, to this deity, was always kept on the 25th of April, to deprecate blasting and mildew. The diseases themselves were long matters of curious speculation, and they were till lately regarded as accidents of vegetation, resulting in a mass of injured cells from the dampness of the soil, excess of manure, or fogs, or punctures of insects, and have even been attributed to the presence of the barberry, a fungus of which, called *œcidium*, is shown in Pl. 6, fig. 10. On the left is seen a piece of the leaf of the barberry, with the spots of *œcidium* upon it. On the right, one of these receptacles, containing spores, is magnified, to show the form of this fungus. The *mycelium* on which it grows is also visible. There have been many botanists who have believed that the spores of *œcidium* come up as uredines when they fix upon any cereal. It is the microscope which has enabled us to recognise in all these parasites a true fungal character, and to trace their growth; but the damage accruing from them has not been adequately estimated, for they never appear in the farm or garden without injury to the produce. For example, few can have failed to notice the effects of *uredo* on the rose trees, and also, but less frequently, on geraniums.

(6.) Numerous have been the speculations, and often ingenious the experiments on the way in which the reproductive sporules find entrance into corn-plants. Various remedies have been tried, and some with success, as in the case of bunt, or pepper-brand, which may be effectually checked by good dressing of the seed. The principle of dressing is the conversion of the adhesive oily matter of the spores into that which is soapy, which is easily washed off. This requires an alkali, and suggests the use of lye of potash, soda, or wood-ashes. Liming also has a good effect. Sulphate of copper and arsenious acid, the arsenic of the shops, are often used; but, besides the other objections to them, there is the danger to the vegetative powers of the seed. It is not usual to dress for smut, which attacks not only wheat, but barley and oats; yet the same reason applies in these cases, except that more difficulties are in the way, because of the dissipation of the sporules before harvest, and the remainder being knocked out in threshing. It is important to ascertain with certainty how the contents of the spores grow. Those of bunt are too large to enter the *stomata*, yet if sown with wheat it reappears. Some think the mycelium divides the earth into molecules, each of which has a vegetative power, and that any one absorbed by the roots extends until it reaches its peculiar point of election in the system. Others conceive that the spongioles of the roots imbibe the fine contents of the spores, which grow. It is certain that due dressings and washings prevent the reappearance of bunt, and that excess of manure encourages red-robin and mildew, which have also been observed to follow long feeding with sheep. Among the antidotes to mildew, I venture to name clean farming, amendment of the texture of the soil, ventilation, and letting in light; checking over-luxuriance in the young plants, growing early varieties in places subject to it, and avoiding putting on manure directly before wheat, and hoeing the wheat when young.

(7.) There seems no reason to believe that any *uredo* mentioned is deleterious, though bunt is disagreeable in the flour. It has been said that in past times, there were gingerbread bakers who had no objection to flour which contained the black matter of bunt, as it saved them the brown sugar

which they otherwise must have used, to render this confection sufficiently dark colored for the approbation of their customers. If such customers there ever were, they must have had more regard to appearance than to quality. But I am now about to describe a fungus closely allied to *uredo*, which attacks grasses for hay, that appears to be quite poisonous. It is termed *ustilago*, having a similar derivation with *uredo*, and is left by Corda in his general classification in the same group. Tulasne wrote a long paper on *ustilago* in 1847, with drawings. The one in question is called *hypodytes*. Its spores are black, round, and very small, and I shall call it *grass-smut*. There was a great deal of it in 1848. In a field near King's Cliffe, almost every flower-stem of the *bromus sylvatica*, which was one of the principal grasses, was infected by it. A plant was taken by Mr. Berkeley from this field, and, instead of its throwing up fertile spikes, almost every one is attacked.

The structure in a very young stage is thread-like, but all traces of *mycelium* soon disappear, and nothing remains but a mass of minute spores. (Pl. 7, fig. 11.) The whole was drawn by Mr. Leonard from the specimen this day exhibited to the audience. In addition to the ruin of the grass, this fungus is most pernicious. According to Leveillé, the immense quantity of black dust resulting from it in the hay-fields in France, produces disastrous consequences on the hay-makers, such as violent pains and swelling in the head and face, with a great irritation over the entire system. A like account was given of these peculiar maladies by Michel in 1845, which he compared to the well-known effects of ergot, on which singular abortion of the seeds of corn and grasses I do not enlarge here, because, though accompanied by a fungus called *ergotetia*, it cannot be called one. Botanists term it *ergotetia abortifaciens*, or ergot fungus, *rendering the seed an abortion;* but the only argument they adduce in favor of its producing ergot is, that it constantly attends it. But it is clear that because two things are coincident it does not follow that they are cause and effect, while the best examination does not warrant such an inference in this instance. I will only remark that it is more common than is supposed; and I am persuaded that cattle in ill-drained localities, where it always abounds, derive serious injury from it, and that it is the unsuspected cause of many disorders both in them and human beings.

Another *ustilago* named *typhoides* damages the stems of reeds, swelling and distorting them, and rendering them almost useless for thatching.

The only remedy for such a disease in a grass-field seems to be breaking it up, and substituting for it a crop not subject to its ravages.

I have not time to dwell on another kindred fungus found occasionally on the gramineous tribes. All are more or less subject to some *uredo* peculiar to them.

(8.) I may be expected to allude to the true theory of *fairy rings*, which are due to three species of the most highly organized fungi, called *agarics*. Mushrooms are agarics. Those of the fairy rings throw out their spawn in a circular direction, and the ground being continually exhausted by it, a ring is formed, which is rendered greener than the surrounding grass by the stimulus of the spawn itself.

I may just observe that in some countries, grasses and corn, and particularly barley and rye, are destroyed by a curious mould, which is developed beneath the snow, and if it appears in snow without previous frost, it is often fatal to the whole crop. It has not yet been noticed in Great Britain, but

the matter will be worthy of attention should any long frost occur. I cannot omit to mention here, that the mouldiness in stacked hay is generally the common *aspergill*, to be described presently, and sometimes the common *penicillium*, also coming under review. The spores of these will be seen to be injurious, and therefore such hay ought always to be steamed. The cut surface of hay-stalks is sometimes covered with a light orange or brick-dust red fungus, which is a fusarium, so termed from the spindle shape of the spores, but it is entirely confined to the stems composing the hay.

II. I go on next to the parasitic fungi of leguminous plants, which are particularly subject to them. A small *dipazea* destroys peas in wet seasons, attacking all parts, especially the pods; but the blight which we mostly see on peas, bears the botanical name *erysibe*, or *erysiphe*, the Greek for mildew, and is the same kind of mould that infests peach leaves. In its early stage it is a jointed mould, seemingly superficial, which on examination shows little globules, changing from yellow to black, and springing from a floccose web filled with minute sacs containing the sporules. (See Pl. 7, fig. 12.) These globules and the sacs containing the spores are here depicted; and a good idea may be formed from inspecting the drawing, of the character of this fungus, as exhibited by the microscope. They put out fibres, which lift them up from the surface of the leaf, and are preceded by threads, white, or grayish, consisting of bead-like joints, of which it seems the uppermost fall off and grow.

Beans are injured by a *uredo*, the *uredo of the bean*, which was very prevalent last year.

Vetches are attacked by a fungus styled *botrytis*, from the Greek βοτρυς, a bunch of grapes, because the spores grow in this way. (See Pl. 7, fig. 13.) This drawing shows a minute portion highly magnified, and will convey a just idea of its appearance and of the cause of its name. It is called the *botrytis of the vetch*, but in some places it attacks peas and lucerne, and it might therefore bear the name of the *leguminous botrytis*. *Botrytis* is distinguished from other moulds which are articulated, and so named *monilia* or *necklace* moulds, by it not having its threads jointed.

Dutrochet first stated, and I have verified it myself by a series of experiments detailed in my little work on the blights of wheat, that if a single drop of almost any acid is mixed with albumen, in eight or ten days necklace molds appear; but, on the other hand, caustic alkali gives *botrytis*. With fibrine of blood and phosphoric acid, the results are reversed. Every sort of vegetable matter I tried with acid yielded a mould, but when albumen contained a neutral salt none appeared. If salts of mercury are present, the mould is stopped; æthiop's mineral does not check it; oxide of lead hastens it; oxides of copper, nickel, and cobalt retard it; oxides of iron, antimony, and zinc have no effect; all perfumes stop it. Flowers of sulphur effectually check the erysiphe on the peach, but they could not be applied to pea-fields. How far a knowledge of the facts I have just stated may lead to a remedy, easily applied in the shape of manure, future experiments may show.

III. These observations naturally lead to the *botrytis infestans*, found on the leaves of the potato when suffering from the true murrain. The *mycelium* of this fungus traverses the entire cellular tissue of the plant, and emerges from the *stomata* of the leaves, choking them, and the consequence is decay. Pl. 7, fig. 14, shows the microscopic appearance. This fungus is, I believe, new to Europe; so widely distributed a species could not

have been overlooked. This diagram is the same as that given by Mr. Berkeley in his admirable paper on the potato fungus. The mycelium may be observed traversing the cellular tissue of the leaf, and one of the threads of botrytis, that to the left, issuing from the stoma. Mr. Berkeley, the very highest authority, is of opinion; and he writes me word, "I am convinced more and more that the fungus is the real enemy." Certainly, all other theories have failed. The principles of the geographical distribution of food-plants plainly show us that extremely minute and unappreciable differences in climacteric condition may throw plants into an unhealthy state; which conditions might exist unsuspected for a few years. Hereby plants may be brought into a state which renders them capable of being attacked by certain parasitic fungi, of which the potato blight may be an example, and the *botrytis infestans* becomes, as it really seems to be, the proximate cause of the malady. The *botrytis* is found on the tubers; but besides this, a *fusarium*, which must not be confounded with the former, nor regarded as characteristic of the potato disease, but of another, often occurring in the same tuber with it. (See Pl. 7, fig. 15.) This fusarium, highly magnified, is represented in this figure. It will be perceived to be totally different from the *botrytis*, and the spindle-shaped spores tell the origin of its designation. Genuine science alone enables us to make such discriminations; and it is not too much to hope that experiments founded on some such results as I have announced from the few I have had leisure to make, may lead to the discovery of a check to the growth of this pestiferous *botrytis*.

The root crop of the farm suffers much occasionally from fungal diseases. Parsneps are subject to a variety of the *botrytis parasitica*, which blights the leaves. The leaves of turnips are attacked by the same fungus; but a different one, called *fusi-sporium*, is found on the roots, but with no extensive injury.

Mangold-wurzel is affected by the *uredo of beet*, with brown or black spores like that of the bean; but in all these cases the connection between the disease of the leaves and decay of the roots has not been sufficiently observed.

IV. Hops are damaged by an *erysiphe*, having the habits of that of the pea. It seems to be in its early stage a peculiar mould, but this opinion needs fuller confirmation. The whole subject needs investigation, and therefore I do not dwell upon it.

V. I now pass from the parasitic fungi of the fields to those found on other parts of the farm, its buildings, yards, and interior economy. The fungi destroying timber are not sufficiently known, though their effects are so common. Dry-rot is generally attributed to the spawn either of the *merulius lacrymans* or *weeping morel*, so called from the little drops of water it contains, or to that of the *polyporus destructor*, named from its many pores. But any of the fungi found on wood, and they are numerous, are capable of producing it; and among them are, besides the two mentioned, another *morel* called *vastator*, the dædalea of the oak, deriving its appellation from its labyrinthine structure; various *polypori thelephora*, from θηλη, a nipple, by reason of its papillose surface, and *sporothricum*, the spores bearing hairy filaments. (See Pl. 4, fig. 16.) The microscopic view of a morsel of sporothricum, (vide fig. 16) is here given very highly magnified. The effects of all these pass by one designation, dry-rot. I will now describe its progress. The first signs are small white points from which a filamentous substance radiates parallel with the surface of the wood. This is

spawn, which, as it gains strength, insinuates itself into any crevices, however minute, and the threads are so fine that they pass between the tubes from which the wood is organized, and forcing them apart destroy all cohesion. (See Pl. 4, fig. 17.) This diagram shows these threads from one of the polypori. Sometimes various spawns interlace and form a tough stratum; and the rapidity and force of increase are such as to cause, under favorable circumstances, the total destruction of the wood. From the experiments previously described on the growth of fungals, you will perceive that the acidulation of the fermenting sap promotes their growth. Kyanizing, or the application of corrosive sublimate, has been resorted to as a preventive. An experiment may be made to show its effects: a solution of fish-glue will be found to yield fungi in abundance, but if corrosive sublimate be mixed with it none will appear, and the same result will follow additions of certain preparations of copper and other mineral poisons. Oak felled in the spring, when full of sap, is almost sure to have dry-rot; therefore that which is destined for farm erections should be cut in winter, for otherwise the only chance of stopping the appearance of the fungi is to substitute some poison by saturation for its proper juices, or to force them out by an objectionable pressure. Immersion in water is beneficial, but heat applied to dry wood only hastens the malady. In Brest dry-rot is said to be unknown, and all the timber used in its yards is kept in a creek of the harbor.

VI. Fungi of a different kind from any yet described follow the British farmer into his dairy, and interfere with his household economy. *Penicillium* and *aspergill* are two terms applied to some of them, because in their microscopic appearance, given in the delineation before you, they resemble sprinkling brushes. (See Pl. 4, figs. 18 and 19.) Fig. 18 represents the penicillium very highly magnified. Aspergill is shown in Pl. 4, fig. 19. They are sufficiently indicative of their names. *Penicillium* is the mould on hay, as was mentioned, and is found on bread, and also in the inside of casks; and there is reason to believe its spores poisonous, for two coopers who entered a great tun, covered with this mould, to clean it, inhaled them, and were seized with violent pains in the head, giddiness, and vomiting, which only yielded to severe medical treatment. A penicillium is the mould of milk, and we have here a magnified representation of its development. (See Pl. 4, fig. 20.) The penicillium may be here noticed developing itself from the mass of the mould. If these moulds appear much in the dairy or on the bread kept in it, the best remedy is washing the walls with chloride of lime, which it is important to know, as milk often suffers greatly in this way. Foreign badly-made cheese has an unpleasant mould in brilliant scarlet patches; but in England the principal one on cheese is an innocent mould called *torula*, from *torus*, a bed, from its coming in layers. I may here just observe that the vinegar plant, as it is called, is in its advanced state a penicillium; and the beer fungus has been called torula; but before we decide the latter, we must see a regular fructification in air. There are hundreds of non-productive spawns for want of air and light, as, for example, the strange forms which diffuse themselves in cellars, which are incomplete developments.

You will permit me to state in this place, that the fungi on stored fruit are a *torula*, a *penicillium*, common fruit *mucor*, and a mould like the first stage of the erysiphe. Harting asserts that he has actually propagated the potato disease from the brown matter in mouldy apples and pears, and it is remarkable that some ingenious experiments of Mr. Berkeley, on the

growth of bunt, lead to show that its propagation may arise from mere grumous matter in the spores, which proves that many of our theories are immature. The experiments were thus made :—Wheat seeds were immersed in a mixture of water and the spores of bunt. A curious mould with conjugated spores sprung up on the spores of bunt. The wheat was sown, and the plants came up infected; but no communication could be traced between the cells and the shoots thrown out by the spores; no intrusion of the *mycelium* developed by the spores into the wheat could be discovered. The inference is, that the fine contents of the spores propagate the fungus; but this is quite opposed to our general idea of the growth of fungals.

VII. I will lastly touch on the facts now established relative to the fungi attacking animal tissues, which are very surprising. Sapy meat has always a fungus something analogous to what is called the yeast fungus. This fungus is a mass of molecules, probably an early state of the same that is called vinegar plant, the last stage of which has been stated to be a penicillium. What are called *sclerotia* from σκληρος, hard, appear in animal matter under particular circumstances; but these are only states of other fungi, for even *agarics* have been known to spring from them. The fungus of the West Indian wasp, of the caterpillar of New Zealand, and the muscardine of the silkworm, are all well-known examples of fungi attacking living animals. The last is easily propagated by inoculating healthy caterpillars, which I mention to show that a fungal disease may be conveyed from one animal to another in a state of health. I believe a more accurate knowledge of such facts will be ultimately of great use in investigating certain diseases prevalent among animals of the farm, and hitherto inexplicable. Sclerotia have been found in bad fractures, but they are not parasites: true parasitic animal fungi grow only on the skin or mucous membranes.

M. Robin published in 1847 a most curious account of the vegetable matters growing on living mammalia, which he classes into two divisions—those of the skin, and those of the mucous membranes. The mucous membranes of the digestive canal and of the lungs are subject to their attacks; nor is the stomach free. All herbivorous animals are liable to moulds in the digestive canal, very like the yeast fungus, but larger; yet it is confined to them, and never found in carnivora, birds, or reptiles. A penicillium of birds is tolerably well known; and pheasants, fowls, and pigeons are occasionally the prey of a mould as yet imperfectly described. An *aspergill* is found in eggs; and that found in the air-cells of the lungs of the eider-duck has been often noticed. Parasitic animal fungi yield, it is said, to sulphuric acid; whence a hint may be obtained as to remedy, but I wish to speak with due caution on these novel investigations. Attempts have been made to inoculate dead animals with these fungi; they have entirely failed; the life of the animal is essential to their growth, the conditions of which seem generally to be imperfect states of respiration or nutrition, or irregularity. There seems to be a moment when the powers of assimilation flag, and then the fungi step in and appropriate the nourishment designed for the system. It may be the same with apparently healthy plants. We may here have the first ward to the key to many a hidden secret as to the ailments of the animals of the British farm.

VIII. I have now completed my humble attempt to give a popular outline of the chief parasitic fungi of the farms of England, which only require simpler names to be easily understood; and the farmer must learn to dis-

tinguish them from the diseases of the superficial tissues. It is a subject well suited to farmers' clubs, where good botanists and microscopists might be induced to attend with their instruments, and give simple explanations. Let it be remembered that simplicity is the handmaid of all useful science, whose truths are only impeded by needless grandiloquence. I can say by experience, that endeavors to propagate it will be found good subordinate auxiliaries to the higher aims of men of my own sacred calling; and while we see that there is not a thing so small or so apparently mean, but that it sparkles with some beam of the skill of its great Maker, I conceive that it befits the office I bear to show that the nobler teaching of Divine Wisdom by things revealed does not tend to deface, but to elevate our conception of God's perfection in things created. This earth was not made to be neglected, nor man to be unobservant; and if these unpretending gleamings I have gathered in my few moments of leisure shall this day have proved in the least degree acceptable to the present audience, or generally of any interest to the British farmer, of the kindness of whose disposition I have had more proofs than I have deserved, I shall rejoice in the honor conferred upon me by being allowed the privilege of addressing you.

IMPROVEMENT OF WORN-OUT LANDS BY THE USE OF PEAS AND CLOVER.

(BY H. BURGWYN, ESQ., OF JACKSON, NORTHAMPTON CO., N. C.)

THERE are large bodies of land lying in eastern and middle Virginia and North Carolina, which have been so much reduced by continued cropping, planting tobacco, cotton, and sowing oats, as no longer to pay the cost of cultivation, and are "turned out as waste lands." These really still possess a good share of fertility, and by a very moderate expenditure of labor, and attention to common-sense principles of agriculture, may be reclaimed, and have their productiveness increased from 100 to 150 per cent. They can be made truly valuable, and I do not hesitate to say, as the result of my experience, that they will give a greater profit in the course of five years' cultivation than can be derived from clearing any except our rich river lands.

This is the method I have adopted, and by which I have increased the product of such lands from 1½ to 2 barrels of corn to 4 barrels per acre; and from 4 to 5 bushels of wheat to 10 and 12 bushels per acre. The increase in wheat is proportionably greater than that in corn. My system of culture is substantially as follows: If the "broom-straw," in which these waste lands always grow up, retains any sap by which when turned under fermentation will ensue, and cause the straw to rot, let the land, *as it is*, be ploughed with the largest-sized plough, drawn by three or four horses, running as deeply as possible, say not less than ten inches, and turning every thing under. If the straw has no sap, it will not rot in a year, and in that case burn it off, and plough as before. If possible, follow each plough with a subsoil plough, and go 6 or 8 inches deeper. This will make the stiff clay, which almost everywhere underlies our land, more open to the general influences of the sun and air; and enable it to get rid of the surplus water of winter, and of heavy rains in other periods of the year.

About the middle of June following, when the weeds are about half-grown, and before they have formed their seeds, sow the land broad-cast, at the rate of a bushel per acre, with any of the numerous varieties of peas common among us, except the "black-eyed," which, having very little vine, affords little shade. In all cases I prefer those which have the most vine, and ripen earliest. Then, if the land has much of weeds or grass upon it, turn under the peas with any kind of plough, running not over three inches deep. If the land is bare of weeds, I prefer covering the peas with a large, heavy harrow, running both ways, first lengthwise, and then across the beds. As it is important to give the peas a start over the weeds and grass, I soak them six hours in water and rub them in plaster of Paris; and when they begin to leaf out and branch, say when 12 inches high, I sow plaster at the rate of a bushel per acre. This stimulates their growth, and they overpower the weeds and grass.

When about half the peas are ripe, not "half ripe," hogs should be turned in to trample and cut up the vines, otherwise it is extremely difficult to turn them under. So soon as this can be done, the hogs should be taken off, for the peas are useful in shading the land from the summer's sun, a most important matter in all improvement, and in giving to the soil a large mass of vines, leaves, and other vegetable substances. From experience in the use of both, I think peas but little inferior to clover (to which family it indeed belongs) as a specific manure for wheat.

After this mass of vine has been turned under, you have a "pea-lay," over which sow a bushel and a half of wheat per acre, and six quarts of clover-seed. Harrow both in thoroughly, and let the work be finished by the middle of October. The return will of course depend somewhat on the quality of the "old field," but I venture to affirm that it will amply repay all labor and outlay, and astonish by the great result from apparently so trivial a cause.

I am familiar with the great increase of crops from the use of lime and clover, and I do not mean to compare the two methods for renovating land as equal; but where *lime* is not to be had, there is no application that can compare for a moment on well-drained land (if it need draining) with plaster, peas, and deep tillage. No gold mine is so valuable as a good marl pit. I am, however, confining myself to interior districts, where neither lime nor marl can be had.

After the wheat comes off in the June following, the clover, if sown early in October, will have grown so as to shade the land pretty well, even on the waste lands I speak of. It should not be grazed the first year at all; in the February after, top-dress it with all the manure to be had, not forgetting to apply all the *old ashes* within reach. This season or time in the year is best for applying manure in our country, where the hot sun acts so injuriously on a bare surface. The roots of the young clover being protected from hard frosts and sudden changes by the manure, it shoots forward with the earliest warmth of spring, and smothers all weeds.

When weeds mature their seeds, they draw upon the fertility of land equal to most crops. Clover gives a crop as profitable as any other, and it is all returned to the land in the droppings of the stock while grazing upon it. As proof of its profit, for three years I have never fed my working horses but once a day on grain or fodder, from the middle of May till the clover fails. They are turned on the clover fields after the day's work is

over, and taken up in the morning in good condition for service. I have never lost one by this management; in fact, they improve from the time they are thus treated, and work better.

After the clover has been on the land for two summers, during which period it has dropped three crops of leaves and stalks, and thereby greatly improved the land, either turn it under as before, in September or October for wheat, or later in the fall for corn the ensuing year. In the former case, you will find your land as thickly set as before, with volunteer clover, which ought to remain as a pasture for the summer, after the second crop of wheat comes off. If corn instead of wheat be grown, sow peas broadcast among the corn at the last ploughing, soaking the seed and rolling them in plaster, as before. After the corn crop, do not suffer the land to "lie out." No error can be more opposed to good farming, than that which assumes that land is improved by "lying out," and permitting a crop of weeds to mature upon it. If we had duly reflected, this error would long since have been apparent, in the continued sterility of thousands of acres lying waste around us, *not a whit improved by "lying out."* After the soil has once been brought up by peas, subsoiling, or deep ploughing and clover—all within reach of the farmer even in the interior—it will not again relapse, unless the former barbarous and senseless practice of exhaustion and negligence be again adopted. If lime can be had, even at a cost of 20 cents a bushel, I would in all cases spread it on the land, after the first crop of peas had been turned under, to the amount of 15 or 20 bushels per acre. This quantity will greatly benefit the land, and enable the owners shortly to repeat the application of a like quantity.

CULTIVATION OF THE TEA-PLANT IN THE UNITED STATES.

Dear Sir:—The frequent notices which have appeared in the public journals, by those who have visited my tea-garden in Greenville, S. C., and by those who have not, seem to render superfluous the addition of another word.

Nothing but your request to make a communication on the subject of tea cultivation, through the Patent Office, would induce me to risk the danger of wearying the public ear and of exposing myself to obloquy.

During the past year the tea-plant under my care has passed through severe trials, from the injury received in transplanting, from the heat generated in the packing-cases, from the want of shelter during the severe frosts of February, from the excessive heat in June, and from the drought of 58 days' continuance in July and August. The plants were divested of their leaves and generally of their branches and twigs in February, during my absence in New York. Knowing that the plants were tender, and not fortified by age and mature growth against severe weather, I had directed them to be covered in case a material change of temperature should occur. But these orders were neglected, and they consequently suffered from that cause.

The plant is sufficiently hardy to resist any weather occurring in this part of the country, when seasoned for one year.

The plant has grown thrifty since April, and the quantity of foliage, buds,

and blossoms, show that the root has taken strong hold, and is now fully equal to produce its fruit next autumn, which always follows the year after the blossoms. I have a variety of both black and green tea-plants. The buds and blossoms of the latter did not appear until a fortnight after the black tea-plant. But the blossoms were larger when they did appear in September, October, November, and December. From present appearances, I think the blossoms of some of the late plants will continue to unfold until spring. It is not an unusual thing for the blossoms and the fruit to appear at the same time upon the same plant. In this particular it differs from any plant I have seen. As my chief object, at present, is to cultivate and increase the tea-nut, it will be a year or two perhaps before I attempt to convert the leaf into tea. The root supports the leaf and fruit, and the leaf the root, so that neither can be spared without detriment.

This climate appears congenial to the growth of the plant, and the soil is so diversified in this mountainous district that there is no difficulty in selecting that best adapted to seed-growing plants, or that designed for the leaf only. Upon the plantation purchased this summer, I have light-yellow, dark-brown, and red clay subsoil, of a friable character, with a surface soil sufficiently sandy to answer the demands of the plant. I do not see any reason to doubt, from a year's experience, that the tea-plant in its varieties will flourish in what I heretofore denominated the tea-growing district of the United States, as well as in any part of China.

The slowness of its growth requires patience. But when once established, the tea-nuts will supply the means of extending cultivation, and the duration of the plant for twenty years diminishes the expense of labor. To illustrate the hardihood of the plant, I may observe, that notwithstanding the zero severity of February frost destroyed the leaves and branches of most of the plants, and those now blooming in great beauty and strength are from roots the growth of this summer, I have one green tea-plant the stem and branches of which withstood the frost of February without the slightest protection, and is now a splendid plant, covered with branches and evergreen leaves, affording undeniable evidence not only of its capability of resisting frost, but of its adaptation to just such a degree of temperature.

I have often remarked that the tea-plant requires for its perfection the influence of two separate and distinct climates, the heat of summer and the cold of winter. The thermometer in this vicinity during the heat of summer generally ranges from 74 at 6 o'clock A. M. to 82 at 3 o'clock P. M., only one day during the summer so high as 86.

This is a most agreeable temperature, nights always cool, which the tea-plant enjoys, and the days hot and fanned with the mountain breeze.

The drought I found the most difficult point to contend with, owing to the want of adequate means for irrigation. I lost 20 or 30 plants through this, and learned that no tea plantation should be established without irrigation. After two or three years there will be little necessity for it, because the depth of the roots will generally then protect the plant.

My plantation at Golden Grove is well supplied with water, or I should not have purchased it at any price.

It is the first and most important point to secure a southern or western aspect, a gentle declivity the second, salubrious air and suitable soil the third.

Our country is filled with natural tea plantations, which are only waiting the hand of the husbandman to be covered with this luxuriant and productive plant.

I know the public is naturally impatient of delay. Like corn, it is ex-

pected that the tea-nuts will be planted in the spring, and the crop gathered in the autumn. But they forget that the tea-plant does not interfere with any other crop, and when once planted it does not soon require a renewal. I have sometimes felt this impatience myself, and longed for a cup of tea of my own growing, but I have never had one. As a husbandman, I must wait some time longer, and let patience have her perfect work.

Your obedient servant,

JUNIUS SMITH.

Golden Grove Tea Plantation,
Greenville, S. C., *Dec.* 11*th*, 1849.

THE MANUFACTURE OF SUGAR.

Extracts of a Despatch from the Chargé d'Affaires of the United States in Belgium.

Legation of the United States, Brussels, *Oct.* 10, 1849.

Sir:—Mons. Melsens, Professor of Chemistry in one of the State Colleges, has been for a long time engaged in making researches with a view to render more perfect the methods employed for extracting sugar from cane and beets. The success which attended that learned gentleman's experiments soon caused a great sensation among the manufacturers and statesmen of France and Belgium.

This could not be otherwise in countries where so large a capital is invested in the growth of beets and the manufacture of sugar from them, in the refining of exotic sugar, and the important collateral interests to which they have given rise. A committee of the most distinguished scientific gentlemen of France and this country were appointed by the two governments, and in the presence of government officers experiments were made to test the efficacy of the new method.

Some of the facts discovered by Mons. Melsens soon became known to the public, and rapidly reached those interested in that important branch of manufacture in other parts of the world. Among others that visited this city, with a view of obtaining information on the subject, were some of our own citizens: one was the Hon. Mr. Chinn. But at that time nothing could be learned, as the process was kept secret. Applications have been made to me from persons engaged in manufacturing sugar in other parts of the United States requesting information on the subject.

In my conversation with Mons. Melsens, and in reading his memoir on the subject, I was struck with the importance of the discovery. I immediately commenced the translation of it, and now send you the first part, which chiefly relates to the manufacturing and refining of sugar cane. The second part, which relates more particularly to the extraction and refining of beet sugar, is not quite finished, but will be sent by the next steamer. It will be remarked that I have retained the weights and measures as they were given. They are simple, and their value easily ascertained. I would suggest the propriety of its early publication, as it will avoid the necessity of a large correspondence, and be satisfactory to numbers interested in the subject.

Very respectfully your ob'd't serv't,

THOS. G. CLEMSON.

Hon. John M. Clayton, *Sec'y of State.*

New Method for the Extraction of Sugar from Sugar-Cane and Beets, by Mons. Melsens, *Professor of the State Veterinary and Agricultural College of Belgium, Corresponding Member of the Royal Academy of Belgium, of the Society Philomathic, &c. Translated from the French by* Thos. G. Clemson.

The extraordinary circumstances in which I am placed make it my duty to extract from a larger work on which I am engaged, the observations most proper to give an exact idea of the researches to which I have devoted myself. Whatever may be the success of my method for the treatment of saccharine substances, I am confident that all my observations will be found exact, and their knowledge may give rise to useful reflections on the part of those occupied in manufacturing sugar, and without doubt to new practical applications in its different branches.

It is a well known fact, that in healthy sugar-cane and healthy beets, all the saccharine matter may be crystallized. It is also known that this matter may be easily extracted by means of weak alcohol, which may be afterwards driven off by evaporation, and leave the sugar in pure and colorless crystals.

In bitter almonds there also exists a substance which may be crystallized by the same means, without losing its purity. But the effect is entirely different when water is used in place of alcohol. This substance found in bitter almonds (amygdaline) disappears or undergoes a metamorphosis, and by the change various new substances are formed entirely different from the original. That water should have this effect, it is necessary that it should come in contact with the air, and that it should encounter and dissolve certain fermenting substances which are found in the tissue of the bitter almonds with the amygdaline.

In the sugar-cane and beets there exist also these fermenting matters capable of transforming sugar into other substances. In order to produce their action, it is necessary that they should be placed in contact with the saccharine matter by means of water, and should themselves be exposed to the air. Every one knows with what rapidity the juice of sugar-cane changes character in the warm climates where it is made; and although this alteration is less rapid in the juice of beets, it is sufficient to create difficulty, and every means have been tried to make the manufacture as rapid as possible, in order to avoid this cause of trouble and loss.

For the chemist who makes any analysis, the problem of the extraction of sugar is solved by the use of alcohol. He, by this agent, separates the saccharine matter from the fermenting substances, and destroys the latter without injuring the former, thus preserving the sugar from any destructive influence. But for a large operation it is necessary that the agent should be cheap and easily managed. Alcohol is dear, its use requires the greatest precaution and is very dangerous. Setting aside then alcohol, is it impossible for chemistry to produce a liquid which has the properties essential for this case, and which, like alcohol, will prevent all fermentation, even when exposed to the air? I think not. I do not even pretend to say that the system which after many trials I have considered the best yet known, is either the only one or better than any other.

In the sugar-cane or beet there is saccharine matter dissolved in water, nevertheless this matter rests in that form a long time without change. If we could then make use of water as a dissolvent in the same manner that

nature does, we should extract the sugar without destroying its quality. The difficulties exist neither in the water nor the sugar, but in the air and in the fermenting matter contained in the cells formed by the tissue, which the contact of water puts in action. This being the case, is it possible to crush the cane, or grate the beet in a vacuum, and extract the juice and boil it without removing it from this vacuum? If it is possible to do this on a large scale, the problem is solved. But this system seemed to me impracticable, and I have not tried it.

It would appear easier to arrive at the desired result by operating with an inert gas, such as carbonic acid: to grate the beets in carbonic acid, to wash them in water charged with carbonic acid, and to water them upon the grater with water containing carbonate acid of lime, or carbonate acid of magnesia. My essays have not had the success I hoped. The least trace of air is sufficient, and these agents do not seem entirely to annul its effects. Their action is therefore uncertain.

I will mention here (only by way of observation) a class of bodies to which recourse is often had to prevent fermentation. These are the metallic oxides, capable of combining with the fermenting matters or the substances from which they are produced, and forming insoluble compositions. The oxide of mercury and the oxide of lead are in this category. For an analysis in the laboratory, the sub-acetate of lead may be easily and certainly employed, for it precipitates the fermenting substances and every thing capable of producing them, and leaves the sugar dissolved. But the unhappy consequences of employing it are too easily to be seen, and have been but too certainly realized every time it has been used in the manufacture of sugar, to permit me to believe in the possibility of using it.

The action of tannin and monohydrated phosphoric acid is different. These two agents coagulate the fermenting substances, precipitate the matters that form them, and purify without heat the juice of either sugar-cane or beets in a manner that renders their application possible.

I thought that I should approach the discovery I sought for in trying,

1st. To prevent fermentation during the extraction of the juice, and to avoid the contact of air while the juice was cold.

2d. To profit by the coagulation of the fermenting substances caused by heat, to carry them off, as is practiced in defecation.

For this purpose, I sought a substance having a great affinity for oxygen, without action on the saccharine matter or danger to man, cheap, easy to produce anywhere or to transport.

Three substances particularly fixed my attention: the bi-oxide of azote, sulphurous acid, and aldehyde. This remarkable class of compositions having a great affinity for oxygen, and which contain already two equivalents of this body, and absorb a third, with facility to produce acids, appeared to me eminently proper to fulfil one of the conditions mentioned, viz: to prevent by their presence the oxygen of the air from acting in producing fermentation. I have no doubt but that some one more capable than myself will ultimately succeed in giving a practical form to the bi-oxide of azote, for I cannot believe but that a substance which destroys oxygen instantly and forms with it an acid proper to precipitate the fermenting matters, will be one day employed in the extraction of sugar. Dissolved in the sulphate of iron, it would guaranty the juice from all alteration until the end of the defecation by lime, and, this accomplished, the juice would retain scarcely a trace of the reagents employed.

Aldehyde or the organic substances which resemble it are too dear; I therefore made no stop at them.

During all the experiments which I slightly mention, I found myself always inclined to return to the use of sulphurous acid. Its efficacy as an obstacle to fermentation is so well proved, its price is so low, its production so easy, and the substances necessary to produce it so universal. It is true that sulphurous acid, which was so successful in the hands of Proust when used to prevent fermentation in the saccharine matter of grapes, has always presented, when applied to the manufacture of beet sugar, insurmountable objections. I was not ignorant either that the most experienced persons had failed in the attempt to use it. Nothing practical has resulted from their efforts.

If sulphurous acid can be profitably used where the must of grapes is concerned; if in preventing fermentation it has no influence on the sugar, it is because it possesses at once these two properties, either of itself, or because it is converted into sulphuric acid by the action of the air. Every one knows, on the contrary, that the cane sugar is changed and takes the nature of grape sugar when placed in contact with acids, particularly with sulphuric acid. Thus, however inoffensive the sulphurous acid is when applied to the must of grapes, it is impossible to use it for the juice of the sugar-cane or the beet; for as soon as the air absorbed by the sulphurous acid changes it into sulphuric acid, the effect of this last on the juices mentioned changes them into grape sugar. Reflecting on this difficulty, I asked myself if sulphurous acid used with a powerful base, such as potash, soda, or lime, would still present this obstacle. I found, in reality, that the base, absorbing the sulphuric acid as soon as formed, left the sugar intact. From this period I was led to make many experiments, easy to reproduce, useless to repeat in detail, and which I will sum up in a few words.

Dissolved sulphurous acid, added to a solution of the juice of sugar-cane or beets, prevents fermentation, but destroys slowly the sugar if left cold in contact with the air. If heated, the destruction is much more rapid.

The neutral sulphites of potash, of soda, and of lime, do not prevent fermentation, but do not injure the sugar whether cold or warm. Neither of these products then would serve.

The acid sulphites, and more especially the sulphite of lime, presented, on the contrary, properties worthy of interest. Sulphurous acid in excess prevents all fermentation. The base which all these salts contain neutralizes the sulphuric acid as fast as it is formed. It remains to be seen if, by themselves or by their excess of sulphurous acid, they have or not the power to convert cane sugar into grape sugar.

I have heated for several hours small quantities of sugar-candy dissolved in water, with a large quantity of bisulphite of lime. The sugar was changed, it became uncrystallizable and deliquescent. The sirup thus formed presented sometimes an appearance with which manufacturers of sugar are well acquainted; submitted to the action of heat for evaporation, it remained motionless.

There was therefore the proper quantity to find out, and much care to be taken; but as it takes a great deal of the bisulphite of lime to destroy the sugar, and a small quantity to destroy fermentation, I thought this agent worthy of a closer examination.

Sugar-candy in cold water with bisulphite of lime, even in excess, crystallizes without loss, and without change, by spontaneous evaporation, at a

very low heat. It is, therefore, possible to manufacture sugar without artificial heat. Further on, the importance of this remark will be made manifest.

Perfectly white sugar-candy being dissolved in ten times its weight of water, I added half its weight of a solution of bisulphite of lime, marking ten degrees of the areometer of Baumé, and boiled it for about an hour. It was then filtered, to clear it of neutral sulphite which was deposited. It was afterwards put into a plate, where it crystallized entirely without a trace of molasses, leaving precipitated, however, a small quantity of the tartrate of copper, which had been dissolved in the potash. Straw-colored sugar-candy treated in the same way gives the same results, only that the crystals are lighter colored than the candy itself. The same experiment with all kinds of sugar produced the same results, whether the liquid, when evaporated, was left acid or had been carefully neutralized after boiling. I found also that the crystallization was as perfect and rapid when the liquid was left unfiltered as when it was filtered before the evaporation.

I have examined with the polarizing apparatus, following the method of Mr. Clerget, the sugars that were produced by these different treatments, and I found—1st. That the crystallized masses gave a direct notation almost identical with that given after the inversion. The differences, sometimes in one sense, sometimes in another, and confounding themselves with the errors of observation, proved that the sugar was not transformed, or that this transformation was practically insignificant. 2d. That portions of the liquids, taken at different stages before the crystallization was complete, presented to the eye all the qualities of cane sugar, and deviated to the right of the plane of polarization, and gave a direct notation almost identical with that observed after the inversion.

It resulted from this, either after crystallization, or in the sirup before crystallization takes place, that no difference is to be found between the sugar dissolved in pure water and that which has been submitted to the action of the bisulphite of lime, when the excess is not too great of the bisulphite, or the heat too long continued. It was then reasonable to suppose that the bisulphite of lime, used as a substance having a great affinity for oxygen, and as an antiseptic, would have no injurious effect on the sugar, if it was poured cold upon the beet grater, or the sugar-cane mill, in such a manner as to mix with the juice the instant the cells which contain it were broken. It was also to be supposed that it would endure the heat necessary for clarifying without injury. In this operation, judging from experience, the time employed would neutralize the bisulphite, leaving the juice purified from the fermenting matters, and prepared for evaporation, without loss of sugar. But I soon found that the bisulphite of lime possessed certain qualities which demanded further attention. White of egg, blood, the yolk of the egg in emulsion, milk mixed with water, when mingled with the bisulphite of lime, and entirely coagulated at a temperature of 100° (centigrade), these liquids, filtered and subjected to evaporation, leave residuums in which are found a small quantity of azotized matters, mixed with sugar of milk, or the salts of these substances.

To its antiseptic qualities and its faculty for absorbing oxygen, the bisulphite of lime joins very great powers of clarification. This gave me the idea of the following experiments. I mixed 50 grammes of sugar-candy, 250 centimetres cubes of milk, 250 centimetres cubes of water, and 50 centimetres cubes of a solution of bisulphite of lime, at 10° of the areometer of

Baumé. I boiled and filtered to separate the parts that were coagulated. The concentrated liquid gave a mass perfectly crystallized, which, examined without drying or purifying, gave 92 per cent. of sugar by direct notation, and 93.5 after inversion by chloro-hydric acid.

The defecation was easy and complete. The sugar was preserved intact, the water adhering to the crystals, and the salt of milk found in the mass explain why there was only 92 per cent. of sugar in the 100.

I employed in another experiment 50 grammes of sugar-candy, half of an egg, white and yolk mixed, 25 centimetres cubes of milk, 75 centimetres cubes of water. This mixture, boiled and filtered, gave a liquid which crystallized without molasses.

The polarizing apparatus gave 85 per cent. of sugar by direct notation, and 86 after the inversion. There was then only the cane sugar and $\frac{13}{100}$ composed of hygrometric water, the excess of the bisulphite of lime, the salts of milk, &c.

The bisulphite of lime at 100° (centigrade) acts as a defecator. It separates the albumen, the casein, and, as will be seen hereafter, the azotized matters analogous, which exist naturally in the cane and the beet. This separation is effected without loss or change in the sugar, except that which may be estimated at $\frac{2}{100}$ of the mass, of which no count can be taken in experiments of this nature.

It remains at present to be seen what part the bisulphite plays in preventing the colorization of the sirup.

The coloring matter of cane or beet sirup comes from four principal causes:—

1st. The substances containing the coloring matters which are dissolved in the juice.

2d. The contact of the air and the pulp creates rapidly coloring matters which are added to the preceding.

3d. The heat employed in the evaporation in changing the character of part of the sugar, and the substances connected with it, forms also coloring matter.

4th. The air, the lime, and the ammonia, aided by heat, give rise during the evaporation of the juice, alkalized by the lime, to coloring matters.

The bisulphite of lime carries away almost immediately the coloring matter which exists in the cane and the beet. It prevents the formation of others during the process of manufacture, and especially of those which require to form them by the action of the air and a free alkali. The bleaching power of the bisulphite of lime with regard to the original coloring matters contained in the cane and the beet, is not absolute. It appears to act by a colorless combination which is formed between these substances and the sulphurous acid; this effect is well known to chemists. When there is a sufficient quantity of green matter to be seen in the stems or roots treated, we frequently see the sirup, after losing its color under the action of the bisulphite, become slightly tinged again as it concentrates, and again colorless when longer subjected to heat.

In preventing the coloring of the pulp, the bisulphite of lime is wonderfully efficacious, and so durable that too much cannot be said of its power. I have kept for six months in badly covered vessels the pulp of beets, which remained colorless from the effects of the bisulphite, when it is well known that, under ordinary circumstances, they would have become very brown from the action of the air. I do not hesitate to say that there are many

cases where the bisulphite might be most efficaciously employed to prevent the formation of coloring matters, which give so much trouble to destroy when once formed; such as those that stain the filaments of hemp, or of flax after steeping, and indigo after it is precipitated, bark juice employed in tanning, the extract of certain dye-woods, &c. But all these points will be examined hereafter. For this moment I content myself with the statement I made above, that coloring matters that are spontaneously produced without heat in the pulp exposed to the air, never make their appearance when the bisulphite of lime is used.

I will add that in the evaporation without artificial heat,—1st, of a liquid formed by dissolving in water cane sugar,—2d, of cane-sirup—and 3d, of beet-juice,—there will be no color where the bisulphite is used; and that where artificial heat is used for evaporation, the coloring is scarcely perceptible; nay more, that the sugar obtained by this process from red beets is completely colorless.

I have never observed perceptible discoloration except in rare instances, and even then it was so slight as to be of no consequence in the manufacturing of a large quantity.

It is thus proved that the bisulphite of lime may be used with success in the extraction of sugar from cane or beets,—

1st. As a powerful antiseptic, preventing the production or action of fermenting matter.

2d. As, from its affinity for oxygen, capable of preventing the changes which the presence of that agent causes in the juice.

3d. As an agent which at 100° (centigrade) defecates the juice, and removes from it all the albumen and coagulated matter.*

4th. As carrying away the pre-existing discoloration.

5th. As an agent capable in the highest degree of preventing the formation of coloring matters.

6th. As capable of neutralizing all the hurtful acids which may exist or be formed in the juice, substituting for them an acid almost inert, (sulphurous acid.)

It remains to be seen under what form or in what quantity the bisulphite of lime should be applied to the cane or beets.

What new facts may be discovered in manufacturing a large quantity, and what inconveniences may overbalance the advantages it seems to offer—this is now what I intend to examine, arguing from my own experience, without exaggeration, but also without timidity.

One of the thoughts which has the most sustained and excited me in the course of my researches, was the hope that, in the equatorial regions at least, sugar might be extracted by the heat of the sun alone. What would prevent, that, once preserved from change, the juice of the sugar-cane should be abandoned to slow crystallization in the open air, like salt in the salt marshes? I should say there was no obstacle, and I call to witness all those who have seen my experiments. They have all been of the same opinion. This opinion and this desire will explain why the experiments I am going to state have received the direction I have given them.

It is well known that there exists in Murcia manufactories for making sugar from cane. They have resisted all the vicissitudes that the commerce

* There remains, however, after this clarification, a matter which is colored by the air, or the influence of an alkali, first violet and afterwards brown. It is probable that it is an azotized substance.

of sugar has experienced for sixty years, and are still in full activity. It is from these manufactories that a friend procured me some hundred pounds of fresh sugar-canes for my experiments. They reached the laboratory of the Sorbonne, in Paris, where I made my experiments, in a good state. They were pronounced by persons who had been in the colonies, and were acquainted with the subject, to have been imperfectly ripened. A good many were worm-eaten. My experiments then, from such materials, could not be expected to be very satisfactory: nevertheless, the first essay I made filled with astonishment persons accustomed to the manufacturing of sugar and capable of judging of the results obtained.

The juice was extracted by a coarse grater, adding bisulphite of lime during the operation. It was clarified by boiling, and simply filtered through a cloth strainer. The concentrated sirup was filtered a second time, and left to crystallize slowly. This it did to almost perfect dryness. An analysis by alcohol could have given nothing better either in quantity or quality. It was even more colorless than sugar obtained by alcohol.

In these experiments all the sugar contained in the juice took a solid and crystallized form. The crystals were large and firm. They were not more colored than ordinary sugar-candy, which they resembled in appearance. The traces of molasses were almost imperceptible.

Taking into consideration the almost entire purity of the juice of the sugar-cane, which really, once clarified, is only sugar and water, and considering also the aptitude which cane sugar has to form large crystals, in which quality it is far superior to beet sugar, I am sure that the first colonist who attempts to evaporate slowly a quantity of sirup, will perceive that the crystals, in size, color, and appearance, are so superior that the advantages of the process will be entirely evident to his mind. I changed the proportions of the bisulphite of lime; I experimented separately on the ripest canes, on the greenest, and on the worm-eaten, and in all my essays the result was the production of crystallized sugar. I never found a spoonful of molasses that could not be crystallized.

The analysis of the juice and the action of the bisulphate on it were always the same, both as regards the substances contained and the quantity of sugar obtained.

The operation is so simple and so correct in its results, that it appears almost necessary to do wrong expressly in order to fail to extract all the juice from the sugar-cane. Every one knows that the juice extracted from the sugar-cane is sometimes not more than the half, never more than two-thirds of the quantity really contained in the cane. There remains then in the crushed cane at least a third of the saccharine matter. To extract this by washing in warm climates is impossible, on account of the rapidity with which fermentation takes place; but if the bisulphite of lime is mixed in the water used in washing, nothing is easier. There is no need for hurry, and the washing may be so perfect as to extract the last particle of sugar.

Thus obtained, these washings would be nearly as rich as the juice itself. Treated in the same manner by defecation at 100° (centigrade), simple filtration and concentration into sirup, and then slow evaporation, they would give the same results as the juice.

I tried with the crushed cane this method with a lively curiosity, and I succeeded in producing large crystals of pure sugar, and much superior in color to the best sugar sent us from the colonies.

Even more, and that for reasons that chemists had already discovered, the skimmings and the filters employed in filtration, after several days' exposure in the air and the danger of fermentation, yielded pure crystallized sugar. It was only necessary to wash all these substances in water charged with the bisulphite of lime and evaporate this water. Thus the bisulphite of lime rendered the sugar almost as unalterable as mineral salt; that of the juice, the crushed cane, the scum, and the filters produced the same large grains of a colorless or slightly yellow candy. All this requires neither care nor study, and nothing renders hurry necessary. As long as the bisulphite exists in the smallest appreciable quantity in the liquid, it prevents all alteration.

I know nothing of the colonies, and it would not, therefore, become me to pronounce if the employment of such a process would or would not have the effect of producing division of property, by enabling the negroes who inhabit them to extract the sugar profitably on a small scale; but I do not hesitate to say, that my essays proved that this change in the cultivation and in property is possible.

It may be objected that powerful mills are necessary to crush the cane. This is not so. A root-cutter and a grater are all that is necessary, because the washing is so complete by the employment of the bisulphite of lime, that all the juice may be extracted in that way from the cane, cut or torn in the rudest manner. However that may be, I will now give the method I arrived at in treating the canes which I had sent to me:—

1st. I broke up the canes by means of a beet-grater, watering the pulp during the operation with a solution of the bisulphite of lime. I then pressed out the juice, which was boiled, filtered, and evaporated by fire to the density of about one-third what the cold sirup should be, filtered again and left to slow crystallization. This gave me in a few days a mass of candy, from which it was impossible to extract any molasses.

2d. The crushed cane or pulp, whichever it may be called, was wet with water, submitted to another pressure, which produced another juice, less rich. This, treated like the first, gave the same results.

3d. I repeated again this last operation.

For all these experiments I employed one per cent. of the weight of the cane of a solution of the bisulphite of lime, at 10° areometer of Baumé. I took out the whole of the sugar, and found all of it in a solid form. My operations, though evidently susceptible of being applied to manufacturing on a large scale, presented at the same time a perfect analysis of sugar-cane.

If experienced chemists, who, like Mr. Caraseca, in Havana, and Mr. Arequin, of Louisiana, are in reach of sugar manufactories, will repeat my experiments on a larger scale, I am sure their opinion will be soon formed.

I will now mention the objection to my process. The sugar obtained by it has a taste of sulphur, but it loses this in three manners:—

1st. Crushed and exposed to the air, the sulphite becomes neutral sulphate.*

2dly. Exposed to an ammoniacal atmosphere, the sugar loses its sulphurous flavor, and often takes a taste of vanilla very agreeable, but it is sometimes slightly colored.

3dly. Clayed so as to lose about 10 per cent. of its weight, it gives a sugar equal to the purest and whitest sugars of commerce.

* As crystallized sugar does not contain solid bisulphite, but only neutral sulphite, this can only give neutral sulphate. If the sugar is acid, this acidity is derived from the acid phosphate of lime, formed by the action of sulphurous acid and the phosphate of lime in the juice.

The sirup used in claying may be regenerated by evaporation, and gives crystals similar to the others. For manufacturing, I recommend the third process. I will only, for the moment, slightly mention a circumstance that may cause difficulty. The sulphates and the sulphites are changed, by the contact of organic matter, into sulphurets. The formation of sulphurets, and the appearance of free sulphur, which would probably be the consequence, are not presented in any of the numerous specimens which I possess, and of which some of beet sugar are already quite old.

I recapitulate: 100 kilogrammes of cane contain about 18 kilogrammes of sugar, when in good condition. They yield 60 kilogrammes of juice, when well managed, and this gives 12 kilogrammes of sugar.

There is usually extracted from the juice from 6 to 7 kilogrammes of unrefined sugar. There is, therefore, a loss of 5 or 6 kilogrammes in the operation, besides which 6 kilogrammes are left in the crushed cane.

It results from this that, by applying the new process to the juice alone, 12 kilogrammes of refined sugar will be obtained in place of 6 or 7 kilogrammes of unrefined sugar. If the crushed canes are also submitted to this process, 17 or 18 kilogrammes of sugar will be obtained from 100 kilogrammes of cane; that is to say, the whole amount of saccharine matter contained in the cane may be extracted. In saying, therefore, that the yield of sugar from cane might be doubled, I stated nothing in which my experiments did not bear me out, and certainly was far from exaggerating.

The future will decide; I await its judgment with the most perfect confidence. The bisulphite of lime will enable the manufacturer to do all which the chemist can do with alcohol; and if the latter extracts 18 kilogrammes, the former will also one of these days.

Whether the evaporation should be carried on to the end by boiling; whether the sirup should be concentrated one-third, and finished in the drying-room; or whether the evaporation should be entirely carried on in cases exposed to the sun, is more than I am able to decide. Local circumstances and studies on the spot will determine this. I will only remark that the use of the bisulphite, by preventing fermentation, renders the use of large shallow cases or reservoirs of wood easy, and permits even rooms of graduated heat for drying.

I did not have at my disposal a sufficient quantity of juice to try these different methods, but I desire to show that they are worthy of essay, and I recommend to the attention of Mr. Caraseca, or any other chemist in a favorable position for trying it, the following experiment:

I took beet juice, to which I added four (4) per cent. of the normal solution of bisulphite of lime. Having clarified it, I put it into a pine case, which I had previously washed well with the bisulphite. The bottom was pierced with holes, each of which had a string passed through it, which hung down, and thus offered numerous means for the juice to run off, and a large surface for evaporation. As fast as the juice was collected in a vase placed under the strings, it was poured over again, and thus concentrated by passing several times; the sirup was placed in a flat vessel, where it crystallized almost entirely. In the little molasses which was separated from the crystals, new crystals were formed, and these last were as perfectly characterized as the first.

If, with beet juice, and an imperfect apparatus, this experiment succeeded, why should it not with cane juice, which is purer and richer, in hotter countries, in the open air, and with a more carefully arranged apparatus?

Why not seek, in the heat of the sun, where it is so intense and so certain, the means of replacing coal or other combustibles, which are not to be had?

Whatever may be the means of evaporation which experience may prove to be the best, the striking results obtained in operating on a few hundred pounds of cane has convinced me that the extraction of sugar in the colonies will hereafter follow new and more profitable methods. The juice and crushed cane being placed out of the reach of fermentation, I was, therefore, fully disposed to take immediately the measures necessary to insure a prompt essay of my system. This I hope to do, (with the aid of Mr. de Tracy, Minister of the Marine in France, who has shown me much kindness,) either in the French colonies or Algiers, where many well-informed persons think that the sugar-cane would succeed perfectly, and where the greater quantity of sugar given by my method would enable them to produce, at a low price, sugar which, from its favorable position, would command the market of the Mediterranean. But, while I was naturally tempted to confine all my attention to sugar-cane, which promised me a success incontestable, quick, and easy, I felt that I owed it to my native country, which has no colonies, and which cultivates the beet on a large scale, and to my master, who on so many occasions has aided the cause of native sugar, to endeavor by every means in my power to maintain the equilibrium between beet and cane sugar, which the results I had obtained threatened to overthrow. This is the point I aimed at in my reiterated experiments on the beet.

As the extraction of sugar from the cane requires crushing, or grating, defecation, slow or rapid evaporation and filtrations, it is very easy from this to form an idea of the operations necessary for the beet. There is, in reality, little difference. But, if the sugar-cane offered results so clear that there was no doubt on my mind of the advantages of the process I tried, the beet presented much greater difficulties to overcome.

Our sugar manufactories are much more advanced, and leave much less room for improvements. As the extraction of the juice is more perfect, there is a smaller loss in the pulp. As the pulp is used for the food of cattle, the sugar it contains is not in reality lost. Having coal very cheap, the process of evaporation by fire suits better. Finally, the juice of the beet containing a considerable quantity of salts, which prevent the crystallization of the sugar, there is a cause of loss which the new process cannot correct.

The calculation, in round numbers, appears to be this: 100 kilogrammes of beets contain, one year with another, 10 kilogrammes of sugar; 1 kilogramme in the pulp, 2 in the molasses, and 7 that the manufacturer can sell in the form of unrefined sugar.

Some manufacturers, they say, reach this quantity; but I should be disposed to think that, even in France, where this industry is so well understood, the general product does not exceed six kilogrammes, from which there results an absolute loss of 1 per cent. of sugar, which disappears during the operation. However this may be, I consider as the limit of all that is to be hoped from my process, for the moment, a yield raised to 8 per cent., or one-fourth, which would be 33 per cent. above the general yield, taking one manufactory with another.

But I have sought less to give to the large beet-sugar fabrics more perfect processes of fabrication, than to furnish means which can be easily employed by all, and are capable even of being used on a smaller scale on the farms themselves.

While I was studying the question in this point of view, Messrs. Claes were using, without my knowledge, processes of the same nature on a large scale. It is for them, consequently, to make known the results. For myself, as I have not yet had the means of judging of the operation of my method with the apparatus actually existing in the sugar manufactories, I can only give the results of my experiments in the laboratory.

First point to be considered—Can all the sugar contained in the beet be extracted? This cannot be doubted.

Washing the pulp with water charged with the bisulphate of lime is an operation entirely in the scope of a manufactory, and done systematically will give a liquid very like the juice itself, and containing nearly as much saccharine matter, and leaving the pulp very nearly if not entirely exhausted. The washings thus obtained might be thrown on the grater, to preserve the new pulp from fermenting.

For the exhausted pulp, I am not ignorant that it is considered injured as food for cattle by this extraction of all the saccharine matter. This experience will decide; but I should be inclined to doubt that this pulp, which, after the washing, is still so rich in azotized and other similar matters, can have lost its alimentary properties. Exhausting the pulp, and afterwards adding to it the molasses, which would give it the sugar and the salts it needed, would seem to me a reasonable and logical operation. Experience alone could decide what quantity of molasses could be supported by the cattle. What I wish to prove is, that the exhaustion of the pulp is very easy, in itself considered, when a liquid can be used which prevents all alteration and fermentation, and permits as much time as is necessary to be given to the operation.

The absolute loss of 1 per cent. of beet sugar, or of 10 per cent. of the original saccharine matter, is not, I am convinced, exaggerated. It is, I think, really under the truth, and on this point I do not doubt considerable amelioration may be obtained.

From whence comes this loss if it is not from the scum, in the animal black, and in the filters, or from the loss from fermentation? The employment of my process prevents these losses. As to the animal black, its consumption will be much reduced in the refining of common sugar. As to the scum, the bisulphite has a double action, the importance of which I do not think I exaggerate. It determines more easily and more completely the coagulation of the albuminous substances, which form the scum: besides which, it produces a scum on which the air has no effect, and which does not ferment. If the operation on a large scale causes difficulties in this respect that I do not perceive, the addition of a few milienes of the bisulphite would suffice to prevent them. It is plain, that to prevent fermentation in the sacks, filters, and instruments employed, it is sufficient to wash them with water charged with bisulphite, before and after using, as Messrs. Dubrunfant and Kuhlman have already advised. From all this I concluded that a well-directed use of the bisulphite of lime will enable us to extract the sugar heretofore left in the pulp, and prevent losses by fermentation. If the removal of these two causes of loss or of destruction adds 2 or 3 per cent. of sugar for the 10 contained in the beets, the operation is not without interest.

I will now speak of another cause of loss. This is the presence of the salts, which are considered as being the principal causes of the formation of molasses. I have observed all the inconveniences that are attributed to the

action of the various and abundant salts contained in the beet. With the sugar-cane a small portion of the bisulphite is all that is necessary, for the washings give results as exact as if alcohol had been used. The reason is, that there are little or no salts in cane juice; with beet juice it is another thing.

However this may be, the treatment by the bisulphite always differs from the treatment by alcohol, precisely because the water of the juice dissolves the salts, while the alcohol does not. It is rare that the crystals of beet sugar can be obtained in distinct form, and they are difficult to produce. On the contrary, sugar-cane gives crystals perfect and easily formed. Therefore there has generally remained, if not molasses, soft sugar, in treating beets.

Admitting, however, the incontestable influence of the salts on the crystallization of sugar, I cannot accept it as the only cause of the formation of molasses or soft crystals. If this was so, in evaporating 40 litres of juice and burning the residue, and adding the salts thus obtained to 10 litres of juice, this juice ought not to furnish crystallized sugar. Now it is very easy to ascertain that this quantity of the salts contained in the beet would not have such an influence.

The production of molasses must, then, be attributed to other causes, independent of this. It would, therefore, be inexact to say, that a process which did not destroy the salts must, for that reason, be without influence as regards the formation of molasses. All my experiments prove the contrary. I have never been able entirely to prevent the formation of molasses, but all the manufacturers are convinced that I have reduced it to a much smaller quantity than the operations actually employed have succeeded in doing. They may, I believe, with confidence continue their efforts in the same direction.

I have been assured that in some of the French sugar fabrics, directed by persons of great experience, the yield of sugar has been carried to eight per cent. of the weight of beets (about one-fourth). This result confirms fully the opinion at which I had arrived by my own researches. I shall be happy if I succeed, by the certainty of my process, in enabling all to do what it has as yet been in the power of but few to accomplish.

I shall at present endeavor to reply to some questions of great importance to large manufacturers. I shall do so with sincerity, leaving operators and men of business to decide what my opinions are worth in that respect.

The manufacturing of sugar has taken such a start in certain parts of the continent that it has given rise to establishments specially devoted to the fabrication of machines used in it, and also for making and restoring the animal black it consumes. There are also distilleries for the consumption of the molasses, from which they extract the salts and the alcohol contained, with profit to the country. All these industries are uneasy.

If the use of the bisulphite be adopted, the new conditions which it will introduce may open new vistas to invention which I cannot foresee. It seems to me, however, that graters will be always necessary, at least until the effects produced by washing the sliced beets obtained from root-cutters shall be more studied. It has even seemed to me so far, that the juice obtained by macerating or soaking was more easily operated on than the natural juice coming directly from the presses and graters.

I do not dare say, certainly, that the presses actually in use will be preserved, even if the graters are. They are calculated for very rapid opera-

tions, but when once the juice is rendered unalterable, slow presses, operating on large masses, economizing labor, suppressing the sacks and the racks, may offer certain advantages and obtain a just preference. Defecation by means of the bisulphite being carried on in the same manner as when lime is used, the boilers for this operation will continue indispensable.

The Taylor filters, or those of the same kind, will be as much needed in the new as the old process, unless it be found practicable to operate by deposit, which is possible.

The apparatus for evaporating by fire might be used in the commencement of the concentration of the juice, but towards the end it would be necessary to have recourse either to rapid crystallization by means of boilers heated by steam, or to slow crystallization by means of stoves. I am sure that either sheet-iron, cast-iron, tinned-copper, or tinned-iron, and probably reservoirs constructed of wood, or bricks covered with cement, may be used.

The use of animal black may be either suppressed, reduced, or continued, according as it may be desired to manufacture refined or unrefined sugar. As to the molasses and the salts contained in it, they might always be employed, except the portion that was thrown on the pulp for the nourishment of cattle.

Agriculture in France requires a quantity of marine salt. It would be much more reasonable to desire salts having potash for base. Now, when it happens that, in a country like the Northern Department of France, where nothing is lost, and where there is such an abundance of these salts in the molasses, and when it is only necessary to give this to the cattle, in order that these salts should be returned to the earth in the form of manure, it is to be supposed that they will soon find reason to cease the exportation of molasses and the salts obtained from it, of which they may be said to rob their land. Countries which produce sugar may export as much of that product as they desire with impunity. Air and water return the elements, but the salts contained in the molasses, once carried away, are not so easily found again.

To exhaust the pulp of all the crystallizable sugar contained, and return a portion of molasses with the salts it contains, would be in my opinion the most reasonable proceeding, taking into consideration the general economy of the country. But, in order to render this method acceptable to private interest, it is necessary that they should find an immediate profit. To do this, there should be a greater profit in extracting the sugar from the pulp than in selling the molasses. Practice on a large scale can alone prove whether this advantage exists, as I think it does.

The indications which I have given above will render easy to every one interested in the different industries connected with the manufacture of sugar, the appreciation of the facts that I have proved in the treatment of the beet.

I grated beets, and watered the pulp with two and a half per cent. of the weight of the roots of a solution of the bisulphite of lime. I pressed the pulp and collected the juice, which I boiled. I clarified it, and passed it through a cloth strainer, and analyzed it by means of the polarizing apparatus. I concentrated by boiling the clarified juice to the consistence of a sirup, which was filtered and placed in a stove, where it formed crystallized masses of a straw color, and the crystals were also examined by the polarizing apparatus.

The analysis of this humid mass, thus made, enabled me to determine the portion of its weight corresponding with true sugar, the rest being represented by water, salts, &c. 4 litres, 356 of juice, containing 521 grs. 4 of saccharine matter, gave a crystallized mass containing 528 grs. 2 of sugar. 0 litre, 984 of juice, containing 105 grs. 3 of saccharine matter, gave a grained mass containing 104 grs. 9 of sugar. 1 litre, 045 of juice, containing 112 grs. 4 of saccharine matter, gave a grained mass containing 113 grs. 1 of sugar. By which it is proved that during the defecation, the first concentration by boiling upon the naked fire, the second concentration in an oven, and the crystallization which was produced, the sugar treated by the bisulphite of lime is preserved without loss or alteration.

In all my experiments the same exactitude was manifest. The differences, always small, sometimes in one sense, sometimes in another, were not generally more than two or three hundredths, a quantity too small to be appreciated in practice. The pulp, being steeped in water and pressed a second time, yielded again a sweet liquid. Washed again, the liquid was not perceptibly sweet. A little bisulphite was added for the last washing. These liquids, mixed together and treated as before, yielded crystallized masses exactly similar to the first. The sugar in these masses corresponded in weight with what the analysis gave in the liquids that furnished it.

The scums and the sacks, washed in their turn in water charged with a little bisulphite, furnished, notwithstanding their exposure to the air, rinsings, which were left for ten days, and all that came from the experiments of each day was added. At the end of this time it weighed four and a half (Baumé). They were treated by defecation, &c., like the beet juice itself, and the result was crystallized masses almost equal to those obtained directly from the beet.

During the long time that I was engaged in making these experiments, I treated beets of all sizes and all colors; red, yellow, white, of every age, young and not arrived at maturity, decayed as well as those that were perfectly sound. In every case the crystallized mass that I extracted contained the sugar unaltered, that previous analysis had indicated. The differences observed were to be attributed principally to physical causes, for the sugar obtained did not always present the same aspect. Beets rarely gave as fine products as sugar-cane. Instead of a firm and well-formed grain, the solidified masses had confused crystallization.

Chemists and manufacturers who are accustomed to manipulating, (the excellent method of assaying given by Mr. Payen,) may convince themselves by a very simple experiment. They have only to treat a dozen beets by the bisulphite, and evaporate the juice after defecation, first to 25° of Baumé. At this point clarify and filter, or even filter without clarification; evaporate afterwards to thirty-seven or thirty-eight degrees Baumé, and leave it for three or four days in an oven at 40° centigrade. The crystallized mass, well pressed, will give an unrefined sugar of a fine color, and of a richness in sugar not only theoretically but practically realizable (as the essay by Mr. Payen's method indicates), which will surpass the yield of all the operations of sugar manufacturers.

But whoever tries to treat beets by the bisulphite will soon discover that there may be extracted from the juice they yield from thirteen to fifteen per cent. of the weight of this juice, of a thick residuum, which, well pressed between folds of filtering paper, leaves from seven to ten per cent. for the weight of juice of white sugar. After having been present at the first of

my experiments, which took place before the French committee, Mr. Clerget, one of its members, in his first experiments made with my process, arrived at the same result.

The sirup boils up very rapidly when the bisulphite is used, but this inconvenience may be easily remedied by employing a little grease, or, what is better, oleic acid. I was not able to account for this fact. It would seem that this phenomenon required that another form should be given to the vessels used for evaporating the juice, especially when it came from unripe beets. I found that my process enabled me to extract sugar from defective and decayed beets as well as from those that were sound. The product differed little in appearance, and the quantity indicated in the beets was found entire in the crystallized masses obtained.

In comparing the well-known practice of the fabrics of beet sugar now in operation with what seemed to be the results of my process, I perceive the following circumstances: The grating of the pulp is done at present in the open air, without any special precaution. The alterations to which this gives rise renders a rapid pression indispensable; but however rapid this may be, it cannot entirely obviate the difficulty. The defecation by means of lime does not prevent but even increases the discoloration, and renders the employment of animal black necessary as a bleaching agent, and an absorbent of the excess of lime. Evaporation at a high temperature modifies a part of the sugar which heat renders uncrystallizable, from which results the necessity of operating by several successive boilings, and the solid sugar is extracted in four or five crystallizations, less and less productive.

By my process the beets may be grated some time in advance, and the pulp of the day before may be slowly pressed several times, and exhausted by washing. The defecation, leaving the juice limpid and colorless, renders the employment of animal black useless.

The juice, evaporated first at an elevated temperature to the density of about 1.3, then concentrated in an oven, crystallizes without color, and solidifies almost entirely, which gives almost the entire product in the first operation.

I was therefore always brought back to the employment of the process of slow crystallization, to which Mr. Crespel-Delisse owed the success which saved from ruin the fabrication of indigenous sugar in France in 1827. In adopting it, I felt sure that by the employment of the bisulphite this process had become much more simple and easy, and that the yield would be much more increased. I was stopped by two difficulties:

Would cattle eat the pulp treated by the bisulphite, and would it not be injurious?

Would the purified sugar offer any special difficulty in refining, or produce any cause of depreciation in the consumption?

It was not possible to decide this question in the laboratory. It requires the manufactory on a large scale to arrive at certainty.

I had arrived at this point when Mr. Paul Claes, manufacturer of beet sugar at Lembecq, came to Paris as one of the committee charged with a special mission by the Minister of the Interior of Belgium to give an account of the results of my researches. He commenced by telling me, with his well-known frankness, that he had himself tried a process that was probably analogous to mine, but that, in case of coincidence, he acknowledged that the deposit of two sealed packets made by me in the archives of the Royal Academy of Belgium and the French Institute, assured my priority.

He gave me in writing the results of his operations in the following terms:

We treated at Lembecq by sulphurous acid near 2,500,000 kilogrammes of beets in the last year. The liquid sulphurous acid, at 4½ Baumé, diluted with 200 times its volume of water, was poured upon the grater.

The beet juice was clarified by lime at about 60 degrees. Chalk was added. Very large lumps were obtained. The clarified juice was almost without color. During the whole operation, no discoloration was discovered that could not be traced to extraneous causes.

The quantity of sugar extracted was greater than usual. The color, without claying, finer; the grain, finer and richer. This sugar, resembling in every respect the finest sugar made, was most favorably received in commerce. Some time afterwards Messrs. Claes, brothers, sent me the fourth products refined and the fifth unrefined, which fully justified the preceding assertions.

My joy was great, I avow, in learning on one hand that sugar treated with sulphurous acid could be easily refined, and offered no difficulty to consumption, and to know that the pulp of 2,500,000 beets treated with sulphurous acid had been eaten by cattle without difficulty. The question of the yield, in comparison with what it had been before in each fabric, yet remained to be decided. It was sufficient for this that I found it had been increased at Lembecq by the use of sulphurous acid.

Mr. Paul Claes thought, with me, that the direct use of bisulphite of lime was preferable to that of sulphurous acid.

Up to this time my researches had been pursued in the calm of the laboratory, but one cannot touch with impunity questions connected with great interests.

The results of my experiments had transpired. The manufacturers of the Northern Department of France became uneasy. The colonial delegates addressed themselves to the Minister of the Marine, in France, and, at their request, the French government named a commission for the examination of my process. The silence so long guarded by the Belgian government was necessarily broken.

In its first sitting the French commission decided that it was necessary, for the security of my operation, that I should have a patent. I immediately took out one, as a means of preventing individuals from paralyzing my efforts and those of the government. We wished the French and Belgian manufacturers to enjoy the advantages of my process.

To judge of the value of a new system in a fabrication like that of sugar, it is necessary to make a series of experiments at different epochs on a sufficiently extended scale.

I publish at present, therefore, this first memoir, in which I have sought to establish precisely the essential facts; and I entreat all the Belgian and French manufacturers, who think it comports with their interests, to make, during the year, a series of experiments, either on the cane or on the beet, making what use they please of the processes which they find described here. I shall be pleased to receive their communications. What I seek is the truth. When my experiments have been verified, as I desire all the world shall have the proof, I wish to insist on one point. The bisulphite, poured upon the grater during the first operations of manufacturing, renders the juice unchangeable. It permits the maceration of the pulp, and its second pressure after having steeped it in water. It corrects the bad condition of the beets towards the end of the season, and renders the fabri-

cation uniform and regular. Let it be essayed in these conditions, in confining its employment to that of a preservative. The capabilities of the manufacturers and the workmen will do the rest. This new process will become gradually familiar, and it will be easier to seize the most favorable conditions for its employment.

If, contrary to my suppositions, the manufacturers of native sugar find no profit in the employment of my process, I shall not for that reason believe that no further benefit can be derived from it in our climate. When all that is necessary to extract easily from 1000 kilogrammes of beets, and to produce finer and whiter unrefined sugar than that now supplied is a root-cutter, one or two barrels and a boiler, such as is used in washing, with a few earthen vessels, is it not to be hoped that the always increasing consumption of sugar will render popular its fabrication throughout the country, and bring in its train all the benefits of the culture of beet? Thus the wish of Morel Vindé may be soon fulfilled.

At the same time agriculture will gain one of the greatest fertilizers, and the laborer the benefit of the consumption of a healthy article of food, at present unknown to him. For, while England consumes more than 10 kilogrammes of sugar per head in the year, the whole of the rest of Europe does not consume more than 2½ kilogrammes per person in the same time.

Whatever may be the method of operating on a large scale, I cannot sufficiently dwell on the importance of the application of the preserving bisulphite to the juice the moment it comes in contact with the air.

For the rest, it is easy to understand that, taking the facts and principles I have given as a base, those employed in manufacturing may put them in practice in various forms. Hereafter I will publish the comparative results of the essays I hope to be able to continue. I will confine myself to indicating here some of these forms:

1st. Defecate the pulp itself.

2d. Defecate the juice from the presses, or from the washings, by means of the bisulphite of lime alone. Filter, through Taylor's filters, and draw off clear after the defecation. Boil directly this limpid solution, notwithstanding it becomes troubled during the concentration.

3d. Defecate by the bisulphite of lime; filter or draw off; evaporate to 25° Baumé.

4th. Defecate by the bisulphite of lime; filter or draw off; evaporate to 25° Baumé; filter; carry the concentration no further than about 38° Baumé. Crystallize slowly in an oven, by the method of Mr. Crespel-Delisse.

5th. Put on the pulp a weak dose of bisulphite to preserve it; defecate in the ordinary manner by lime; filter, or use animal black; add bisulphite sufficient to obtain a neutral or slightly acid liquid; evaporate to 25° Baumé; filter and boil.

In all these cases good results would be obtained by returning the sirup that runs off to the boilers for defecation, but it must be understood that this operation cannot be repeated more than a few times.

6th. Defecate by the bisulphite; filter or draw off; concentrate the juice to about 25° Baumé; neutralize it, or render it slightly alkaline; make use of animal black, and afterwards proceed by the old methods.

7th. Pour upon the grater a weak solution of the bisulphite; defecate with lime; operate afterwards in the usual manner.

Before finishing, permit me to recall, in a few words, the experiments of

learned men, or practical manufacturers, who have preceded me in the work I am engaged in.

We have all taken our point of departure from Proust, whose name will always be honorably connected with the history of sugar.

Independent of the well-known use he made of the change operated by the sulphite of lime for the extraction of grape sugar, this illustrious chemist indicates, in the Journal of Physic for 1810, the application of sulphite of lime for the juice of the cane, the maple, &c. It is to him, then, that is due all the honor of the discovery. Sooner or later his opinion must triumph. My happiness will be to have disengaged it from some difficulties, and to cause it to be accepted in practice.

Some experimenters followed this indication. Mr. Drapier in 1811 employed sulphurous acid. Mr. Pepère failed in 1812 in his essays with the same acid.

Mr. Jordan de Haber recommends the use of sulphurous acid for clarifying, but he employs, without distinction, sulphurous and sulphuric acids, or lime.

Mr. Boulin took a patent for the employment of sulphite of alumine in 1846. The use of this salt had been already indicated by Mr. Stollé, in a patent taken in 1838.

Mr. Merge took out a patent for the use of sulphurous acid and the sulphuret of calcium, which had been already proposed by Mairet de Reims for grape sugar.

In this rapid enumeration I purposely omit two patents, which give a full description of the employment of sulphurous acid and the sulphites—one by Mr. Dubrunfant, dated 1829; the other by Mr. Stollé, dated 1838.

No one will suppose, I am sure, that I had the intention of setting aside the experiments of a person so worthy of consideration as Mr. Dubrunfant. One thing astonishes me which is, that his penetration did not enable him to discover the reason of the failure of several of his processes.

The patent of Mr. Dubrunfant is printed in vol. 27 of the Collection of Expired Patents. Instead of discussing it, I refer the reader to the patent itself.

The patent of Mr. Stollé is printed in the Collection of Expired Patents, vol. 67. Manufacturers and chemists will appreciate at once where Mr. Stollé and I differ. They will give their just value to the points we start from, and will see upon what facts we base our theories.

For the rest, far be it from my thoughts to give myself the credit of the application of the principle of change to cane and beet sugar. I acknowledge that the credit all belongs to Proust, and that we have only followed him. There remained something to be done to render practical the happy and original idea of this great chemist in the manufacture of cane sugar, as well as that of the beet. If I have succeeded in this, I am willing all the honor should be given to Proust.

Note.—The translator is not only struck with the importance of the above discoveries with reference to the cane and beet, but cannot help thinking that they may be applied with success to the extraction of sugar from the stalk of the Indian Corn. T. G. C.

THE DEGENERATION OF THE SUGAR-CANE.

IBERVILLE, LOUISIANA, *January 28th*, 1850.

DEAR SIR:—I wish to call your attention to the subject of the sugar-cane, hoping that you will be able to render important aid in procuring seed, or a new variety from its native country, where it produces prolific seed. Last year a portion of the cane which was reserved for plants was spoiled, so that the planting was short. This year it is still worse. I reserved sufficient to plant one hundred and fifty arpents: but they will not plant seventy-five. And besides, there is no certainty of getting a good stand when the seed is defective.

It was generally supposed that the cane was spoiled in the mattress, by the continued warm weather after it was mattressed. But I am confident that it is a disease of the plant, and that, unless a remedy can be found, the great sugar interest of Louisiana must fail. While grinding in November, I noticed that some of the cane brought to the mill had, instead of a bright, healthy appearance, a dull, dead hue; and on examination, I found the centre of the bud of a dark color, with red around it. The centre of the lower end was hollow, and the upper end had a whiter color than is natural. After being exposed for a few days, the buds became entirely dead and black.

There was a very good description of the sugar-cane in the Patent Office Report for 1848: but it is an error to suppose that the cane cannot be propagated from the seed. This may be the case when the seed is obtained from plants that have been produced for a number of years from buds, or eyes. All plants that have been produced in this way for a series of years lose the faculty of forming prolific seeds; and the sugar-cane is governed by the same laws which govern the whole vegetable kingdom. It cannot, therefore, be expected to produce seeds after it has been cultivated for a great length of time.

The *Creole* or *Crystalline* cane has been cultivated in the West Indies more than two hundred years. The *Otaheite* and the *Ribbon* were introduced there by Lieutenant Blight from the South Sea Islands, where he found them growing wild; and no doubt they continue to grow there yet, and to produce seeds that will germinate with proper care and attention. I suppose that the Ribbon canes are hybrids. The *Violet* or Bourbon cane is the species which is best calculated for this country (although there may be other varieties equally good that have never been introduced here), and of this I would like to obtain the seed. Several kinds are cultivated in the East Indies different from any of ours.

The remarks in the last year's Report about planting tops and the poorest cane are very just; and this practice cannot be too much reprobated. As Mr. Benjamin says, the Creole cane has been run out by that process; and no doubt the Ribbon and the Violet have become degenerated in the same way, so that it is now necessary to obtain a fresh supply. From your official position in the Patent Office I trust you will be able to render us some assistance, by causing directions to be given to our foreign consuls or naval

commanders who may visit the South Sea Islands, to make inquiries and procure the grain, if it can be had, and, if not, all the different varieties of the cane which can be found. It may perhaps be difficult to preserve the cane during a long voyage, but I suppose it could be preserved uninjured a length of time, if packed in sand well dried, and kept in a cool place.

You are better qualified, however, for giving such directions than I am. Should you need any assistance from the President in promoting this design, I am confident that it will cheerfully be rendered, as he takes much interest in the agriculture of our country; and I should have written to him on the subject, but disliked to trespass upon his time, which I know is entirely occupied in the faithful discharge of his official duties.

Very respectfully, &c.

J. PRITCHARD.

BACON FOR EUROPE.

As a matter of interest to farmers as well as packers, we copy the subjoined circular of Allen and Anderson, who are among the oldest and most extensive provision dealers in England:—

CIRCULAR.

LONDON, 1st *October*, 1849.

SIR:—The growing importance of the trade in provisions from the United States induces us to offer a few remarks on the business of the season now closing. That it has been an unprofitable one to almost all concerned, cannot be doubted. That it has, notwithstanding, taken root as an increasing branch of commerce, is proved by the import returns; and that the consumption in this country has been greatly stimulated by the immense supplies thrown in, is we believe beyond all question.

Commencing with bacon, the imports of American into London were—

In 1847	14,161 cwt.
In 1848	70,823 "
In 1849 (9 months)	140,096 "

A considerable portion of which was soft, oily, inferior quality; and to this circumstance more than to the great quantity, the serious declension in prices and consequent heavy losses to the shippers are attributable.

The article best adapted to the London market is singed sides of about 56 to 64 lbs. each. Some of the early arrivals of these last winter came of very fair quality, and the meat of a good firm texture. The dealers, tempted by the prices being from 12*s*. to 15*s*. per cwt. under the Irish, at once introduced them to their customers; nor did a decline of 8*s*. on the Irish abate the demand for the American: and we have little doubt that, had the quality and firm texture continued to improve, the Irish must have gradually yielded, as to any weighty supply, to the cheaper production from the United States.

But the subsequent arrivals were comparatively so carelessly put out of hand, so soft, oily, and inferior, and so mixed in sizes, that Irish sides were again preferred, even at advanced rates, while the American became and continued a dull, dragging trade—many of the best dealers abandoning the article altogether.

It remains to see whether the defects above alluded to in the American bacon can be remedied the coming season; whether an article can be profitably sent from the States that will command a sale of 8*s.* @ 10*s.* under the price of Irish, and maintain its ground on its own merits.

Shippers must, however, calculate on a currency for the best sides of probably 34*s.* @ 38*s.* 40*s.*, here. The Irish will be in greater supply than last year, though still insufficient to meet the wants of the country; while the low prices of all other descriptions of food will prevent any very high rates ruling for bacon.

Ice-cured singed Sides, or shipments made during the summer heats, do not answer; the meat sustains in all cases an injury that lowers the price, and in some instances has done so to the extent of 50 per cent. Shipments of singed meat by New Orleans ought, for the same reason, to be avoided altogether, or made only in the months of December and January.

We have referred more fully to the article of singed sides, because it is the leading one of the London trade, and we expect may be made most profitable to export from the States.

Scalded Sides, of similar cut, are saleable at 4*s.* @ 6*s.* under singed, and where the length of the transit might cause liability to heating, are to be preferred.

Boneless Long Middles and small Square Middles, either boneless or with the rib in, are the next best articles adapted for this market. Some of the first arrivals of these last year were very fine, and met a prompt sale at 40*s.* @ 45*s.* up to 48*s.*, but the subsequent immense shipments were of such mixed, and commonly of such soft inferior quality, and also of such large sizes, that not only did the market for all kinds break down, but the character of American bacon generally was injured, and even the best articles swamped by the quantity of inferior.

Boneless Long Middles should weigh from 40 lbs. @ 50 lbs. each, the smaller preferred. Short Square Middles from 18 lbs. @ 25 lbs. each. All bacon is best packed in well-seasoned boxes, to contain about 3 cwt.

Hams this year have come out of superior cut and cure, but the bulk are still obnoxious to the serious objection of over-saltness. This is a fault so fatal to a quick sale, that it ought studiously to be avoided; less than one-half the salt would be sufficient; nor, when packed for export, need there be beyond a very slight sprinkling put into the cask. In the past season, heavy losses have accrued in consequence of the late period at which large quantities of hams arrived. There is always a falling off in the demand towards the end of July; it is therefore unsafe to venture on shipments after June. We had a brisk demand at 40*s.* @ 46*s.* for the best sorts, up to the 10th of July; whereas, since then nearly all kinds have been unsaleable at 30*s.* Some smoke-dried small sized hams, of excellent quality and handling, arrived last January, and met a ready sale at 64*s.* Dried hams should be from 10 lbs. @ 14 lbs. each, in casks of 5 @ 6 cwt. Hams in salt should be from 15 lbs. @ 25 lbs. each. Long cut are in all cases preferred.

Shoulders should be mild as possible, the weightier the better, and if the whole neck end of the side be left on, they bring 2*s.* @ 3*s.* more.

Tierce Middles, *Strips*, and all *pickled meats* for domestic use, have been in singularly bad demand throughout the past season, and still continue so. We are unable satisfactorily to account for this, unless it be from the abundance of, and low ruling prices for, other middles. The sizes best suited for sale here are 10 @ 15 middles per tierce of 336 lbs. Strips generally run too fat by at least half, and are in consequence now quite neglected.

Prime Mess Pork has been a losing article. Some few of the first arrivals of New York and Baltimore brands came of prime quality, and brought remunerative prices. But almost all the Western brands have come particularly bad, defective in cure, wretched in color, and the meat soft and inferior. The pressure to sell them caused the market to give way, and the subsequent glut of similar inferior kinds prevented all hopes of a rally, and operated most injuriously upon both the prices and character of American pork. The stock still on hand is very considerable. Fair good quality, though offered at 40*s*., and the inferior descriptions, though offered at 32*s*. @ 34*s*., find few buyers; whereas, had the article been of really prime quality, all would have been cleared off at 50*s*. and upwards.

The chief defect in almost all American prime mess pork is the color. Instead of being the bright cherry red, characteristic of skillfully pickled meat, it is a dirty, dull, unsightly brown. That this is remediable, and arises in the manufacture, is proved by some few brands coming otherwise. But unless it be obviated, the preference will continue to be given to Irish and Hamboro, although inferior meat, at much higher prices. The low prices at which the government contract for 6000 tierces for the navy was taken last week, are evidence that the Irish and Hamboro manufacturers look to get the raw material very considerably under the prices of last year. There are already sellers of Irish prime mess for Nov. and Dec. at 64*s*.; and judging from present appearances, we think that American best brands will rule at from 50*s*. @ 56*s*.

Beef needs little remark. The great bulk of the large shipments of last year came of excellent color and quality, and though prices lowered in consequence of the quantity arriving, yet the stock has been nearly all got through, and the character of the American beef confirmed as being superior to the Irish. The absence of the usual government contract this year, owing to a sufficiency in store, will cause the Irish shippers to compete for a share of the trade. But at about present rates we expect a large demand for the best kinds of American.

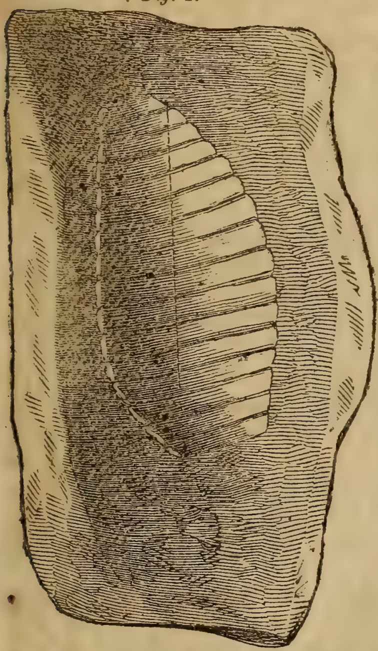
Lard has been in considerably less consumption the last eight months, arising chiefly from the serious reduction in the price of butter and tallow; both these articles continue low, and disappoint the sanguine expectations of many as to a smart advance in lard. The experience of the past season proves that lard in white kegs, refined in the States, does not answer. The English refiners turn out a neater and firmer article, having the advantage of a delivery at once to the dealers, without the liability of heating and injury during the passage. These kegs are at present in active demand at 42*s*., while the American are very unsaleable at 34*s*. @ 36*s*.; we therefore recommend shippers not to refine their lard, or put it up in expensive packages. The same remarks are in a great measure applicable to bladdered. Unless very neatly put up and carefully packed, it is extremely liable to breakage in the transit, and is also a difficult sale here, except the quality be very superior. The demand for bladdered is in fact giving way to the increased inquiry for the English refined in kegs, which are now turned out

of hand so improved in quality, and so neat in package, that they are taken in families in preference to bladders. Seventy tons of American bladdered lard were bought three weeks since at 37*s*. for the sole purpose of remelting, and about 20 tons of inferior do. at 32*s*. for chandlers' use.

We are sir, truly yours, ALLEN & ANDERSON.

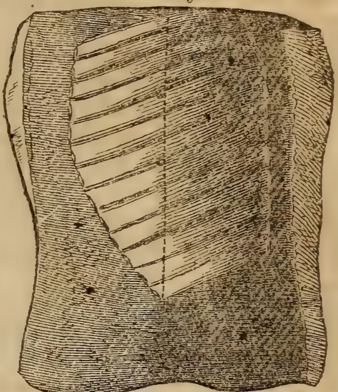
The most saleable styles of bacon, middles, and hams, in the Liverpool and London markets, are represented in the annexed figures:

Fig. 1.



LONG MIDDLES—*Rib in, blade out. The rib must not be cut through, but merely scratched with a saw and cracked.*

Fig. 2.



SHORT MIDDLES. *Rib in. The ribs to be scratched and cracked the same as long middles.*

Fig. 3.

HAM.—*Long cut.*

Fig. 4.

HAM.—*Short cut.*

HORTICULTURE AND POMOLOGY.

Considerable interest has been awakened within the last few years in favor of fruit-culture and horticulture in general, through the agency of societies, magazines, and books designed to improve both the gardens and the orchards of the United States. From the numerous pomological and horticultural associations now in active operation, and especially from the "American Pomological Congress," as organized in the city of New York in October, 1849, much practical and truly useful information may reasonably be expected. At no distant day the cultivation and consumption of good fruits in this country will reach a figure far above what is now generally expected. It is a mistake to suppose that annuals like cereals, furnish the cheapest food for man. Although bread and meat will never be dispensed with, yet a much larger portion of apples and other fruits, when grown in the most economical manner, will be consumed by the millions, because these luxuries can be increased indefinitely, and sold low without an entire loss of profit. When tested near its utmost capacity, an acre of ground in most of the States can hardly yield more of human sustenance in any other crop than in one of apples.

In climates well adapted to figs and grapes, an acre can be made to produce an immense amount. It is estimated that over 300 acres are planted with the vine within 12 miles of Cincinnati; nearly two-thirds of which were in bearing last year (1849), producing, notwithstanding the rot, from 50,000 to 60,000 gallons of wine. Mr. R. Buchanan says: "Some vineyards in good seasons have produced at the rate of 600 to 800 gallons per acre. A bushel of grapes will, if well ripened, yield 3½ to 4 gallons of wine." The Catawba is the principal wine-grape cultivated in that vicinity. The American Pomological Congress holds its next session in Cincinnati, commencing on the 11th September, when it is understood that the Ohio State Agricultural Society will hold its annual fair and cattle-show.

We have received a pamphlet of 60 pages, containing the proceedings of the North American Pomological Convention held at Syracuse, N. Y., Sept. 14th, 1849. From this we make several extracts, and should gladly copy more, did the limits of this Report permit. This society has been united with and merged in the Pomological Congress, at the head of which is the excellent and distinguished Marshall P. Wilder, of Massachusetts, long known as the President of the Massachusetts Horticultural Society.

Those wishing to keep up with the rapid progress of pomological and horticultural science should take either "The Horticulturist," edited by A. J. Downing, author of "Landscape Gardening, "Fruits and Fruit-trees of America," and other standard works, or "The Magazine of Horticulture," edited by C. M. Hovey, of Boston, a standard work, which has reached its sixteenth volume.

Periodicals devoted to the collection and dissemination of useful knowledge in the several arts and sciences which pertain to agriculture, fruit, and horticulture, are rendering the country a service of great and enduring value.

REPORT OF THE COMMITTEE

OF THE NORTH AMERICAN POMOLOGICAL CONVENTION FOR THE STATE OF ILLINOIS.

(From the "Proceedings of the N. A. Pomological Convention.")

Gentlemen of the Convention:—Your committee for the State of Illinois has directed me to report personally, as it has been found impracticable for us to meet in session. I would observe, however, that I have seen all the members (with one exception), and have corresponded freely with them, and with many of our professional brethren in northern and middle Illinois. But I am sorry to be obliged to add, that I have obtained no reliable information from the southern portion of our State, and which, I fear, has in more ways than one, established an indubitable right to the local synonym of "*Lower Egypt.*"

It should be borne in mind that our State extends through more than five degrees of latitude; and that the general aspect and character of the country, though somewhat diversified, is very unlike any of the older States. Its great and distinguishing, or generic features, are its *prairies.* They extend with few interruptions from Lake Michigan to the Mississippi, west and south, and are the principal lands devoted to cultivation in the State of Illinois.

We have no mountains, and few elevations of sensible note. We are in the habit when speaking of our lands, of dividing them in the first place, into "timber and prairie lands." The timbered lands are again known as "river bottoms," "groves," "burr-oak openings," and "barrens." The prairies are known as "wet" and "dry"—or high and low—and "level" or "rolling" prairies.

The river bottoms are often composed of deep alluvial deposits and rich natural soils, left from the subsidence of the waters, when our great lakes abandoned their southern outlet; and perhaps annual additions from floods, and from the vegetable accretions of unknown years since that event. But much of the timber lands near the streams are of a different and less desirable order, ranging from those which produce the burr-oak, hickory, butternut, black-walnut, and bass-wood, to those covered with the white and black oak. The former of these are always good; the latter generally poor, and often barren, and worthless for agricultural purposes.

It is worthy of note that timber is always found on the easterly side of the streams in the prairie country; and where you find natural timber, there you will find water more or less permanent and abundant.

The "groves" or "islands," as they are fancifully called by the old squatters, are scattered over the whole face of the country, and are the only *landmarks*, and the most beautiful feature of prairie land, as God made it. The groves are in size from the solitary cluster of trees that you might count in a breath up to those of miles in extent, and furnishing fire-wood and fencing for hundreds of prairie farms.

The soil of the groves is, in general, better than that near the lakes and streams, (the alluvion excepted), partaking more of the nature of the surrounding prairie.

Burr-oak openings are intermediate in their characters. They are found in detached groves, or at the skirts of the heavy timber of the water-courses and basins. The burr-oak soil is always good, and often excellent. "Barrens" are found everywhere: some are sandy, others clay; they are fortunately of small extent, though of frequent occurence, in the timber region. The sandy barrens produce well when highly manured; the clay is avoided by all cultivators of American origin.

The best, and, fortunately for agricultural purposes, the largest sample of wet prairie, is to be found at and near the lake end of the Illinois and Michigan Canal, along the ancient outlet of the lake, in the vicinity of Chicago. Much of this prairie, where underlaid with sand or gravel, is easily drained, and makes good land, though apt to suffer from drouth. That over clay, with a very deep and peaty soil, is liable to the same objection; but after thorough ploughings, it is more retentive of moisture, and produces constant and most abundant crops.

Many small tracts, known as "wet prairie" fifteen years ago, and rejected by the first settlers, have become dry by being annually mown and fed down by domestic animals, without other than its natural drainage, and exposure to the sun and air by the destruction of the impervious screen of tall "slough grass."

The "dry prairies" are generally very similar in appearance, so far as surface is concerned. Small portions of "level prairie" are found everywhere, but to constitute dry prairie it must be "rolling." Between the waves on this great ocean of God's own beautiful sod are the "sloughs," the terror of the early emigrant, and the most valued possession of his successor; as often affording water, and always an unfailing and most luxuriant natural meadow. These sloughs are the drains of the dry prairie. They are in general nearly parallel, and oftenest at about a right angle with the course of the rivers; they are from 40 to 160 rods asunder, and sometimes of many miles in length. The soil of the dry prairie is from 12 to 18 inches deep in this region; the wet prairie, in general, much deeper; and the alluvion, as in all countries, of irregular and often astonishing depth.

Soils, Subsoils, Manures, &c.—C. R. Overman, pomologist, of Canton, Ill., writes me:—"The natural soil of our county is evidently an alluvial deposit, abounding more or less with lime; that of the prairies is a rich, black loam, on an average two feet in depth, with a trace of fine sand. In the timbered lands, a strong clay soil of less depth generally predominates, though in some places it is a deep, rich, friable loam, similar to that of the river bottoms."

Mr. E. Harkness writes:—"My locality is 20 miles west from Peoria, lat. 40 deg. 30 min., on the table lands, elevated about 250 feet from the Illinois river. The soil is a rich, dry mould, resting upon a bed of yellow clay, slightly mixed with fine sand. I have found the roots of young apple trees, not more than four inches in diameter, which had penetrated *four feet* downwards into the clay, and ten feet from the collar of the tree—so that this may be regarded as permeable to the roots of trees," &c. &c.

M. L. Dunlap writes:—"The whole country north of the 'coal region' appears to be underlaid with lime rock, of various qualities, of unequal strata and irregular dip. It occasionally crops out, and furnishes an excellent caustic lime for building and agricultural purposes, while in some places it is magnesian, and highly charged with sulphate of iron."

That the surface is everywhere "highly impregnated with salts of iron," says Mr. Dunlap, "is easily shown by driving a green oak stake into it, and letting it remain a few weeks, when it will be found that the iron has united with the tannic acid of the oak, and given it a fine blue-black color."

There is a great abundance of lime in our subsoil everywhere through this region, and I doubt not, iron and potash in a liberal proportion. But as I have specimens of soil and subsoil now in process of analysis by Professor Blaney, of Rush Medical College, I shall await his report, hoping to append it to this paper in season for publication. Professor Blaney's analyses have been interrupted by the prevailing epidemic in Chicago. But it will come in good time, and will be scientific and reliable.*

I will merely say that probably nine-tenths of this region has a *clay subsoil*; the balance, sand and gravel. The white clay is of various depths; I have found it from 15 to 25 feet, and then blue clay to the depth of 40 feet; after that, quick-sand, above the limestone. Our soil is generally very dark colored; in fact, black, from carbon, probably. The soil becomes lighter colored by cultivation, and as our English neighbors say, "sadder," and then it requires manure, and manure is at all times *useful*, in no country more so, though not always *necessary*. We are not in the habit of saving or using our manures with much care; further south, the cattle-yard is removed instead of the manure heap.

For fruit trees, especially the apple and quince, I have found barnyard manure, half-decayed chips, charcoal, and ashes, serviceable, and so says Mr. Miller. Many seem to think that the annual burning of the prairies furnishes potash. They forget that this potash comes from the soil, to which it is returned in a free state, and immediately taken up again. The combustion probably furnishes most of the carbon in the surface soil, and this is taken from the atmosphere. The soil is generally blackest where deepest; and driest, where the subsoil is sand or gravel, or as clay or sand predominates in the surface. Generally, that soil which contains the least undecomposed vegetable fibre suffers the least from drouth, and vice versa. But deep and constant cultivation, and judicious drainage, soon equalize and regulate evaporation, infiltration, and absorption, on most of our lands over clay; and judicious manuring, and occasional "seeding down," will keep them good, though they will gradually lose their dark color in the process, and doubtless much of their natural fertility.

Few orchards receive much manure, and it is highly probable that more trees (taking all sorts) are injured than benefited thereby, in our rich prairie country. Mr. L. Montague writes Anson S. Miller thus: "I will here remark, that there is not one foot of land in Illinois that requires manure for fruit trees, other than ashes and lime, and old compost," &c. "Peaches, plums, and cherries should never taste manure."

Climate.—The climate of Illinois is extremely variable. Our winters, though comparatively short, are very cold, and we have, in general, little snow to protect plants at and above the surface of the earth. The ground some seasons freezes deeply; others, not at all, except in exposed situations. Our winter is often a double one; a "cold snap" in December, mild in January, and then cold again in February. The changes in temperature are sudden and violent, and fruit trees suffer therefrom in various ways. We cannot plant in autumn with any degree of safety, as the constant

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* See "Analysis of Prairie Soils," page 488.

freezing and thawing of the ground throws the plant from its bed, unless artificially protected by a deep covering of litter or a mound of earth, and then, the shock that the *vital principle* receives from their removal renders them less able to withstand the effects of our sudden and violent alternations of heat and cold, and a liability to disease, or actual death, is the result.

In this corner of the State, the influence of the great lakes is beneficially felt during fall and winter, and reversely in spring and early summer. Our coldest winter winds are from the west, and those of spring and summer from the north and east.

As you go south, the climate, though still variable, is much milder, until at its southern extremity we find it as propitious as that of some of the Southern States; the cotton-plant maturing a partial crop, and the indigenous cane, though dwarfish, surviving the winters. I have received no figures from the south, and cannot therefore give the range of the thermometer from below our lake region. But the report from Missouri will doubtless supply the deficiency.

I regret having to say that I have kept no register, and that the figures furnished me by my friends in northern Illinois are so widely different, that I am inclined to believe that some of their instruments must be imperfect. I merely state that the range, as given me (for 1849) by men of science and observation, is from 30 deg. *below* to 102 deg. *above* zero, in the shade. I will give a few figures from the most reliable sources only:—

1849. For Chicago, by Prof. Blaney, coldest day, 15 deg. below 0.
Near the Grove, by M. L. Dunlap, coldest day, 16 deg. below 0.
1848. At Elgin, by Mr. Truesdell, December 7th, 16 deg. below 0.
1849. At Elgin, by Mr. Truesdell, Jan. 20th, coldest day, 19 deg. below 0.
1849. At Napierville, by Mr. Ellsworth, 20 deg. below 0.
1849. Near Galena (questionable authority), 30 deg. below 0.

I have the most complete report from our member, Hon. Anson S. Miller, of Rockford, Winnebago Co., Ill., (some 50 miles northwest of the Grove,) and which may be taken as an average standard for northern Illinois.

Mr. Miller writes me, that he is indebted to Dr. Haskell, of Rockford, for his figures, and that the doctor is minutely regular and correct in his observations. I condense as follows:

1848. March: From 10 deg. to 40 deg. above zero at sunrise; but one day, (March 3d.) after the 20th Feb., 20 deg. above 0.
1848. April: Average 35 deg. above zero, at sunrise.
1848. May: " 45 " " "
1848. June: " 60 " " " Hottest day, 19th, 92° at noon.
1848. July: " 60 " " " Hottest day, 10th, 96° at noon.
1849. Coldest day, Feb. 19th, 18 deg. below zero, sunrise.
1849. Average of Jan. and Feb., 20 deg. above zero, at sunrise: warmest winter day, 48 deg. above zero: one of the coldest winters since the settlement of the country. I have no record of the quantity or depth of the snow; both were considerable, though not equal to some winters. The ground was but little frozen.

The proportion of clear, sun-shiny days, during our summer and autumn months, an average of seasons, is as more than two to one; and believed to be nearly one-third more sunshine than east of the lakes.

From the weight of testimony, and all the figures received, I am inclined to believe that the range of the thermometer for 1849 may be set down at 117 deg., or from 19 deg. below zero to 98 deg. above zero, at noon, in the shade; and where the transitions are as rapid and considerable as in this latitude, you may readily infer, that none but the hardiest trees, with wood fully matured, are at all times safe from the influence of such great and sudden changes of temperature. The past winter and the present summer furnish the most abundant and discouraging proofs of the fact. Perhaps at least three-fourths of the peach trees were entirely or partially winter-killed, throughout this whole region. Pears have suffered very considerably, especially those which made a large growth the preceding season. Plums have been injured in some places, and even apples. Nectarines and apricots are mostly dead. Cherries, where but little wood was made, have withstood the winter as well as usual. But shrubbery has been badly cut down: nearly all the hardy June roses killed to the snow, and even lilacs dead, "root and branch."

Our summer has been a cold one, a few hot days to the contrary nevertheless, and the early growth in the orchard and nursery has not been large; and the occasional very hot days, or some other malignant influences, have seared and blighted the early foliage as with fire. Nearly all the fruits, the locust and some hardy forest trees even, have shown more or less of this partially scorched appearance in the June and July leaves, though the growth at this time (August 30) is good and the foliage healthy.

But notwithstanding all these grave disasters and natural drawbacks, it will be seen that Illinois is bound to be perhaps the greatest fruit country in the world. Labor is dear, and trees have heretofore been difficult to procure. Still we have persevered, and shall continue to plant trees, until the bleak and naked prairie swells shall become a rich and varied landscape of dotted fruit groves, gemmed and glowing with Pomona's ruddy treasures, drawn from the well-wrought mine below, the ardent sun, and the free air above, which shall then come to all with

"The breath of orchards big with bending fruits;"

with health in its breezy sigh, and luscious promise in its grateful odors, more delicious than the "perfumes of the East," and more healthful than all the nostrums from the days of Hippocrates down to this, par excellence, *the age of patent medicines*.

It is nearly 200 years since the first settlement of this State by the French, at Kaskaskia and Kahakia; and yet I have no certain evidence that there is a fruit tree of a cultivated variety, 40 years old in Illinois, and I am well assured that there are but very few of even half that age.

There were a few squatters in northern Illinois, possibly a dozen or more families, at the time of the Black Hawk War, in 1832. But as the Indian title was not extinguished until the spring of '35, no permanent settlement was commenced until the summer and autumn of that year, so that in reality the country is but from 14 to 15 years old, counting from the date of the first considerable immigration. When I first visited this region, only fifteen years ago, there were not ten families where there are ten thousand now; and I did not see a fruit tree, or even so much as a currant bush, this side of the present capital of the state, though I was told that there were some seedling trees near Peoria; and afterwards I saw apple trees near the garrison ground, Chicago, planted by General Beaubian, while Chicago was our remote trading post; and there were also a few trees set by Doctor Harmon,

probably about 1833 or 1834; but, except some worthless Morello cherries, these have all disappeared.

The first occupants here were mostly of the true squatter breed—genuine frontier's men—that, like "the white man's fly," the honey-bee, always precede the actual settler—so that no attention was paid to orcharding; and in truth few cared much about planting trees until we could be tolerably certain we were planting upon our own lands; and of this we had no evidence until after the surveys, and no security until after the land sales. The last of these events occurred only about eight years ago; and the former, the year before. From this era we date the commencement of fruit culture in northern Illinois, though for some years thereafter we were all poor, having been drained by our land purchases, and more especially by the $\frac{50}{100}$ to "cent per cent." per annum, which we had to pay those who kindly loaned us a good share of the money.

Now, let us see what has been done in these nine years at most. I am a son of New York, and love my native State; and yet I declare, without fear of contradiction, that we in northern Illinois have done more to create good orchards in the last nine years than you had done, "west of Cayuga Bridge" up to the date of our commencement. Go where you will over these broad prairies, which fifteen years ago were the homes of the "Red man," and were tenanted only (except along the streams) by the wolf and the badger, the prairie-chicken and sand-hill crane, and you will find orchards and gardens, not equal, of course, to yours *now*, but *better* than the majority of yours nine years ago; not larger, for you have many orchards of large seedling trees—or had then; I see you are working at the tops of some of them now, and for this you deserve much credit. But we are doing better still. We are planting the best known sorts, and we are planting them liberally, and they will liberally—ay, abundantly repay the care and expense. The best evidence of what an insular region may be doing in the way of planting orchards, with the certainty of ample profits, should be sought in the number and extent of her nurseries, and the number of trees imported from abroad; but of this in its place.

We have some seedling orchards from 10 to 15 years old; further south they are more numerous, as well as older. It is generally remarked—and with truth—that our seedlings are better than the same class in the Eastern States. Soil and climate have doubtless much, if not most, to do with this fact; still I am led to believe, despite the Van Mons' theory, that the selection of seeds may have had its influence. We reason from analogy, and are apt to believe that like should produce like. We know that the rule does not hold good with regard to fruits; still we follow it—at least here, and we have seen some astonishingly favorable results. I will state an instance. My brother, H. Kennicott, purchased a part of his farm from a man who had a peach orchard on it, from the pits of "Hoosier peaches," to wit: small, worthless, late varieties, principally cling-stones. These trees have borne five or six years, and have withstood the last hard winter. I have annually seen and tasted the fruit, for they produce abundantly,—and they are actually worthless, except for seeds. Illinois hogs would not eat them, and they are all alike, and like their originals. Now for the reverse. Another neighbor, while East some years ago, ate a few good early peaches, probably Barnard's early. He planted the seeds—about a dozen: they grew, and have borne six or seven years—two of the crops very large—and sold readily at $3.50 to $4 per bushel. Of these I have eaten annually;

they are large, and all good and early, and all alike,—and, as the others, like their progenitor as nearly as the person can recollect. These, of course, are extreme cases; still I think they will find their parallels in all parts of the State; and I have certainly tasted *ten* passing good seedling apples here, where I have *one* in New York; and from my position I have the tasting of many.

There is, a few miles from the Grove, quite an orchard of seedling pears, 14 years from seed planted here. All are bearing, and, what is curious, are bearing abundantly this year; the only ones I have seen. These trees came into bearing from the 9th to the 12th year, and the fruit is said to be good, though I do not remember having eaten of it.

The most of trees planted in northern Illinois, until within the last five or six years, were either home-grown seedlings, or "Hoosier trees," generally from the region of the Wabash, though some came from southern Illinois. These are often seedlings or sprouts, though sold "under name" by the tree pedlars. These trees have made a famous growth, but they show very little fruit; and when evidently worked, are too often found no better than our own seedlings. Indeed, my neighbor Mr. Talcott has quite a number of size to produce 16 to 20 bushels of fruit each; and I do not believe they have borne one bushel each, all counted, since they were planted, 14 years ago; and what is somewhat characteristic of "Hoosier trees"—or pedlar's trees—they are all of the same worthless, if not nameless variety. But for their lack of fruitfulness I cannot account—it being a general complaint urged against southern trees in northern Illinois. I have thought that this might be owing to the fact that most of these early trees were worked on sprouts, or small portions of the root of large seedlings; but it is more likely that the change of climate is the cause of this unfruitfulness, joined to their astonishingly rapid and uninterrupted growth. Most trees brought from the north and east have come early into bearing, and have not made wood with great rapidity.

Of Nurseries.—There is no part of the world better supplied with nurseries than Illinois, though few of them in the north are as yet fairly operating "on their own bottom"—most of them being either connected with, or purchasing largely of Ohio and New York nursery-men. As I am somewhat deeply interested in the business, I have taken great pains to come at the nursery statistics of the north-west. I have visited many of the nurseries, in fact most of the larger ones, and I believe that there are now, either partially operating, or about to operate, or in some stage of actual inception, not less than 50 establishments, within a space of from 50 to 60 miles north, west, and south of The Grove, Lake Michigan being on the east. Twelve of these nurseries are in this county, and most of the others within 25 miles of me, "as the crow flies."

Of the nurseries in this county, I can say from personal inspection, that at least five of them are quite respectable; and though I am not positively certain, containing, I should judge, from 30,000 to 80,000 trees, not including young seedlings, of which one nursery has perhaps over 10,000, and all have more or less. And in addition to fruit trees, the most of us are well supplied with ornamental trees, shrubs, and plants, of which some of us have certainly as great a variety as most Eastern nursery-men.

Of the nurseries in Kane Co. (one of our best and richest interior counties, by the way), I will let Mr. Truesdell, of Elgin, speak. He says, in a late letter: "Six nurseries are already established in our county, setting annually 100,000 grafts or more. How much budding is done, I know not.

I intend setting this summer about 30,000, &c. North, west, and south, nurseries are established, or being commenced, in nearly the same ratio. So that, with what our Eastern brethren are doing for us, and the 'right smart chance' of southern trees annually peddled through the country, it will come to pass, one of these years, that fruit trees and ornamental shrubs will be about as plenty on the prairies as burr-oaks and hazel brush are on the barrens." Mr. T. is wrong there: "burr-oaks and hazel brush" do not flourish "on the barrens." It is always comparatively good land where they predominate.

Mr. Harkness, of Peoria, writes me, of recent date: "Our operations in starting young stock this season have been very successful. We have started 31,000 root grafts; 80,000 young seedlings for budding; 40,000 stocks for grafting; about 200,000 Virginia thorn plants; and 350,000 wild orange plants—all of which look remarkably well."

There are many large nurseries in Mr. Harkness's vicinity, and through the entire central portion of the State. One nursery-man, not two degrees south of us, sold the past season, as I have been informed (though it needs confirmation), not less than 20,000 apple trees under name. John Slater, of St. Albans, writes me that he sold 13,000 the last spring, and the season was bad and competition active. Mr. S. propagates all except peaches, nectarines, &c. by *layers*, which root and are fit for planting in about 3 or 4 years. The best are then sold, and the balance set in rows in the nursery and relayed. He sells at $40 per 1000, or 6¼ cents each, "all around," apples, pears, plums, shrubbery, &c. Not much chance for successful competition there, if his trees are, as he asserts, better rooted, larger, finer, healthier, and earlier, and better bearers, than worked trees of the same varieties.

All the nursery-men through northern and middle Illinois with whom I have communicated, as well as those in southern Wisconsin, (our own neighborhood,)—where roads were impassable alone excepted—write me that they have "sold bare," and that the business promises well: still, I fear that some of us must "wind up," or do worse. It strikes me that we are, at least about here, as they say South, "running the thing into the ground;" and yet this one fact speaks volumes for the good taste and intelligence of our inhabitants, and the adaptation of our soil and climate to the cultivation of fruits.

Nursery-men are, I believe, always intelligent men, and should be shrewd observers, though I fear we are not all good "business men." Our *bumps* of benevolence grow with our trees, and we are very apt to think we are benefiting ourselves when we are doing good to others. Our "hope is large"—our fruition small. We create the plant; others eat the fruit, or enjoy the profits. But the practice of our beneficent profession humanizes us, and simplifies and refines our tastes, and makes us better and happier, if not richer and wiser men. Why then should we not be satisfied with our share of the good we create?

The price of nursery trees varies much in different portions of our State: from Mr. Slater's tariff of charges, viz: "Sixpence a tree for all sorts, and two trees given for every twenty purchased," up to our own rates, which are substantially the same as in western New York; though pears and plums, and choice cherries (which are imported), have sold at from 50 cents to $1.00 each, according to size, and not often in reference to scarcity of variety, or the popular demand. Apples and peaches only are abundant with

us; other fruits are never found equal to the demand. South of Joliet the ruling rates are lower than ours—say about 12½ cents each for apples and peaches, and about 25 cents for pears, plums, and cherries, when of choice sorts; but, as here, these latter are not abundant, and their varieties are limited.

In the north our catalogues are based upon those of New York and Ohio, though some of us have many southern names unknown to you, and, I fear, some worthless fruit; I have seen near fifty synonyms given as *varieties* in one catalogue, the *true* name being there also; and I have counted forty-seven *new names* in a southern catalogue. Nursery-men, as well as orchardists south, complain that they have received many trees not *true* to name, some of them from Eastern establishments. Our lists need purging, and some of our orchards, like Mr. Allen's pears, may need reworking. Still, we think that we are not worse off in this particular than you of western New York.

The Apple.—Here, as elsewhere, north of 36° the apple is the principal fruit. We have tested, or are now testing, all the varieties of western New York and Ohio, and some of our nursery-men have introduced the most approved of the southern Illinois and Indiana varieties. Mr. Overman, of Canton, Ill., sent me a box of their early local sorts, and I am compelled to acknowledge that, to my taste, the apples sent me were fully second-rate, and at least as good (I think much better) as some now generally cultivated as the Oslin, Hawthornden, &c.; and they are set down as free growers, early and abundant bearers, &c.; and it is more than probable that some of these sorts are worthy of general cultivation in the West.

I shall not attempt to describe these local sorts: 1st, because I have seen very little of them; 2d, because I hope to be able to present the later ones with this paper to the Convention; and 3d, I shrewdly suspect that some of them will prove to be old varieties under new names, though most of those sent me by Mr. Overman are known western seedlings.

We have fruited about fifty sorts under name here at The Grove, and some of my friends have fruited more. Ours that have come into bearing are not all true to name; but are mostly so. Some varieties that are said to bear well at the East are miserably unproductive here. The Oslin, Harrison (worthless any way), Newtown pippin, Roxbury russet, &c. &c.; and I am afraid that the universal Rhode Island greening will prove a shy bearer, though the specimens we have had are all very large and fair. The Spy, Spitzenburgs, &c., have not yet fruited with me; neither has the Baldwin, and this, also, is much distrusted with us. From all parts I hear complaints of some of these varieties, the Newtown pippin particularly, as unfitted for a hot and dry climate; and the Rhode Island greening, and Roxbury russet, as cracking at the collar of the nursery-tree, and as shy bearers in the orchard. All that have fruited it speak highly of Rawle's Janette as the apple for Illinois; and say that the white and yellow Bellefleur are "perfectly at home" on our rich prairie soils. Most southern men speak of "Limber Twig" in terms of great praise. It is said that the Carthouse, or "Red Romanite" of the south, is one of the most profitable market varieties, from one end of the Mississippi to the other. Here, of all keeping apples, the Poughkeepsie, or Winter russet, has produced the largest crops.

Of Autumn Apples.—The Rambo receives the most praise farther south. Here, all the varieties that have come into bearing appear to be as good, or better, than at the East; and with the exception of the Oslin, the summer

fruits are all at home here. The Yellow harvest is rather a shy bearer as yet, but the fruit is large, generally fair, and most excellent; and we hope that older trees may produce better crops. Of all early fruits, that not over-good sort, the Keswick codlin, is the most early, uniform, and enormous bearer. With regard to season of maturity, I am fully persuaded that *early fruits*, if differing at all, are rather *later* here in the Lake region, than in the same latitude near the seaboard; and that most *winter fruits* mature earlier than at the East. In the former I may be mistaken, as my opportunities for observation have not been great; and trees, when they come into bearing, are apt to be a little anomalous in their fructification. I account for the fact by the character of our late spring and early summer weather, which is comparatively cold near the Lake, and generally wet; while our midsummers and autumns are hot and dry—the sun acting fiercely upon foliage and fruit, while the previous condition retards those of earlier habits. In the southern part of the State winter apples are very liable to the *black-rot*, spots, &c.; but I have seen very little of this here.

Insects.—The borer is rather troublesome near the timber in all parts of our State. He is native, and is found in the thorn and many other native trees. I have seldom seen the marks of this insect nearer than 18 inches above the ground; and have *never* seen him "at or near the collar of the tree." Ours may be a different species. We find from one to four in each mark, generally two or three. He never enters the wood until the second year, and I think comes out during the third and fourth summers. The borer is not plentiful except near the timber. We always endeavor to cut him out before he has time to bury himself in the wood. He is easily destroyed.

We have a few canker-worms, imported ones I think, as I have never noticed them except on imported trees. We have an abundance of the small native caterpillar; and I have seen a few nests of the large ones on imported trees. The *bark-louse* is found on most Eastern trees, especially those that produce inordinate crops of fruit. I have not observed this insect on thrifty native trees. The green *aphides* are very troublesome. Last year these pests checked the mid-summer growth of seedling apples, so as to make budding impracticable. I have seen none to speak of this year, except on my tender roses.

Some years ago, apples here and south were worked on sprouts and sections of the roots at large—and often, old seedlings—now, on the entire young seedling plant. There is much more budding than grafting done, at least in northern Illinois. Nursery trees south, and in the middle of the State, make an astonishing growth. Here, the early growth is but little better than in New York, though the late growth is sometimes dangerously rapid and luxuriant, causing the bark to burst in winter, and subjecting them to the risk of winter-killing altogether.

In speaking of the "Fulton Apple," one of the best Illinois seedlings, Mr. Harkness says he measured the original tree (in the orchard of Elijah Capps, Esq., near Canton) when 19 years old, and it gave 36½ inches in circumference 3 feet from the ground; 28 feet across the top, and 25 feet high. It had borne large crops for ten years in succession. The same gentleman says, in a letter just received: "I can now take at least ten bushels of fruit from trees, which in the spring of 1840 were mere switches, and have produced their entire heads since that time."

We commenced our orchard eight years ago last May. We had a few

seedlings before, and my brother some Hoosier trees planted out in 1835, (which, by the way, have never borne much,) and we had from a Keswick Codlin six bushels of apples the sixth year, and about the same quantity of Poughkeepsie russet. We purchased our trees of Col. B. Hodge, of Buffalo, and they were of the ordinary nursery sizes. Some of these trees have borne every year since the second after planting. Those that never fail are the Keswick Codlin, Summer Rambo, Hawthornden, pound sweeting, Sapson, black apple, &c. These instances are sufficient to show the productiveness of the apple tree in Illinois. In planting our orchard trees, we dug holes 4 or 5 feet across, and 18 inches deep at least; we mixed in a little manure and refilled the holes, planting near the surface, so as to cover the roots in their natural position, and within the influences of light, heat, air, and moisture. We keep the ground in good condition as to cultivation and manure, wash the trees with soft-soap and water, and destroy most of the insects, &c.; but otherwise leave them to nature, no "hand-saw" or "jack-knife" ever mutilating their luxuriant and beautiful heads.

Pears.—Few pear trees were planted in Illinois, until the last three or four years. Those that have shown fruit promise very well. My white Doyennes the last year were truly delicious. One tree, but seven years from the nursery, produced nearly a bushel of large, perfectly fair, and very excellent fruit, and it bore perhaps a peck or more the preceding season. A Stevens' Genesee, Easter Buerre, and a few others of doubtful names, have borne well, and except one, which I take to be an "M. Jean," were good: My dwarfs have not yet fruited, but in Chicago some have produced well, especially a Bartlett, in the garden of J. Y. Scammon, Esq.

Pears are apt to make too much wood here, late in the summer. Many of mine, in the orchard that had made great growth, were winter-killed down to the snow; the trunk being black and dead, the branches green, and the foliage opening well, when they were discovered and amputated below the line of demarcation, and a few of them have sent up a fine shoot from above the bud.

I have twice seen what I presume to be "frozen sap blight," consequent on late growth. I carefully removed the diseased bark in May, and covered the wound. All the trees recovered, and two of them have borne fruit. I think the affection is not uncommon here, but may in general be avoided.

I have never seen what is known as "insect-blight," or "fire-blight," or, par excellence, "pear tree blight," though the affection is said to be well known far south of us, and possibly west, near the Mississippi. A letter from R. Montague, addressed to Mr. Miller, would seem to favor this idea. Mr. Montague says, that "of ninety-six pears in my orchard, all are dead, or dying from blight." He is in latitude 42 deg. 30 min., and says that many of his "apple trees are dead from the cold last winter." I therefore conclude that his pears are *winter-killed*, not *blighted*. But I will not dwell on this opprobrium of our science now; suffice it to say, that I believe we are in the habit of confounding several distinct diseases, of different origin, and requiring different treatment both preventive and curative, under the dreaded name of "blight." The one disease, or phase of the disease, most deprecated, may be "epidemical," like the potato rot and the cholera, and may possibly, like these, disappear, to return again after an interval (God send it be a long one); or it may be "endemical," and find its origin in a deficiency of some necessary principle, or in the excess of some noxious one, entirely local. The remedy will yet be discovered. We cannot consent to

risk even the partial abandonment of the most popular and delicious fruit in the catalogue; and we are approximating so near to a reasonable certainty in agricultural, and especially horticultural science, that we shall for very shame be compelled to investigate and determine this vexed question.

During the last summer our seedling pears were for the first time badly affected with "leaf-blight." We received them from the East, and they had suffered from the disease there. This summer our own seedlings, as well as some healthy ones from Canada, lost their foliage from the 20th July to the 10th of August. A few put out new terminal leaves, but the most of them are now (September 1st) entirely naked. Can this disease be contagious? I should think not; and yet this has a sensible leaning that way. The soil on which our seeds were planted was worked two feet deep and was sufficiently moist. We syringed with solutions of sulphate of iron, but without benefit.

Pear trees of choice varieties are in great demand in our State, and will soon be abundant if we can rear stocks. A few avaricious or ignorant nursery-men have used *sprouts*, or, worse still, the *apple*, as stocks, to the evident damage of their reputation, and the great disappointment of many who deserved better treatment at the hands of nursery-men. But there are quacks in all professions, and true men sometimes humbug themselves, and very innocently cheat their best customers.

But, gentlemen, for the eradication of all false notions and the prevention of error, we look to you and the action of national fruit conventions. We are all a very little given to credulity, and we *must* believe each other. A book before the eye was never yet equal to "the subject" in hand, or under the dissecting knife of the operator.

The Peach.—Next to the apple, the peach, from the ease with which it is produced from the seed, and its early fruitfulness, has been most extensively cultivated throughout the West. Few, however, are found in our markets except seedlings, and some seasons these have been abundant and really excellent, and yet have never sold, so far as I know, for less than \$1.50 to \$2.50 per bushel in the orchard, and often at from \$3.50 to \$4.00 when taken to market. Mr. Schenck (eighteen miles from The Grove) has had four or five crops in the last nine years, *two* of them very large. One year (1847 ?) it was in proof in court, that the value of \$2000 was sold from this orchard; and several others in this region have sold from \$500 to \$1000 worth in a season.

I think that about here we get one full crop in three years, on an average; and perhaps always a few specimens in the intermediate years. Further south and in the middle of the State, they do much better—say three crops in five years.

And yet, were it not that the peach bears young—sometimes the second, and often the third year—we should be discouraged; for from much observation I conclude that the average age of the peach heretofore has not been over six or seven years in northern Illinois: not dying from premature old age, but, like the cherry, from the effect of our soil and climate, and naturally faulty cultivation. Of perhaps one hundred trees planted in my orchard between 1836 and 1845, but *one*, and that my *oldest seedling*, is now alive; all my worked ones dead, over three years from bud, and at least half of the younger ones. The last winter was very hard on the peach; nearly all those "in the bud" were killed in some nurseries, and few of any age escaped where cultivation had been high, or the lands deep and rich. Ours

that survived were all on our poorest and driest soil, and with a northern or western aspect, and received *judicious* cultivation.

The peach will not bear liberal culture here, and will not long survive if sparsely planted on a black, deep soil, with a *southern* exposure. We now select the highest elevations and the least sunny aspect, and plant but eight feet apart, "in quincunx," raise a crop of early potatoes, perhaps, the first year, and then no crop but peaches. A neighbor, whose peach orchard is on a high white oak "clay barren," not cultivated, has always had some fine fruit, and lost very few trees last winter.

I have found but *one* "peach grub" in my native trees. We find a few in imported trees, which we are very careful to destroy. I have heard of a few doubtful cases of "yellows" far south. The "curl" of the leaf is very common in June. Our worst affection is the "gum." This I think is something like "frozen sap blight" in the pear,—a sort of *gangrene*, or rather *erysipelas*, caused by sudden alternations of cold and heat, acting upon a too luxuriant and immature growth. We usually pare out the gangrenous bark, and cover the wound with clay or wax; but they generally die in a year or two at most, when badly affected.

We now cultivate our peach trees (after the first year) during the spring and first summer month only, and give them a northern or western aspect when practicable. Trees thus situated live thrice as long as those receiving a reverse treatment. We prune but little—merely "shortening in" occasionally, and removing dead wood. The varieties cultivated are the same as those in Ohio and western New York, though a few native sorts of promise have been introduced.

The Plum.—The plum tree succeeds to admiration on our deep prairie soils, and "sets" enormous crops of fruit. But, alas! the curculio makes sad havoc, and often leaves us scarce a single unmarked specimen. Most of our best soils are light "sandy loam," and this is the proper home of this "hump-backed little Turk," where he winters unharmed, and breeds and multiplies to an extent which threatens the ultimate abandonment of this and other beautiful and delicious fruits of its class, unless a more practicable remedy than any now attempted should be discovered. The curculio, like the apple-borer, is native here, and he finds the nidus for his young in the oceans of native plums everywhere indigenous, and unfortunately everywhere preserved or introduced into fields for their cheap and tolerable fruit.

I had flattered myself that from the fact that my choice plums in the immediate vicinity of my groves of wild ones suffered most from the curculio, that this depredator was not inclined to emigration, and that our prairie orchards distant from his native home might escape his ravages. But I fear not. I have this summer seen a fine young plum orchard (near half a mile from the timber), the trees for the first time covered with swelling fruit, and, so far as I could perceive, every one bearing the crescent mark of the inevitable destroyer.

I have noticed the fact, heretofore reiterated by plum fanciers, that in our heavy clay soils the wild plum comes to perfection, while in the light soils all are dropped.

By selecting the clay soils, *paving* the light ones, and making "hog pastures" where we are to poor too pave, and shaking and hand picking when we have but few trees, *after* the destruction of the native trees we may have a sufficiency of choice plums; but, with our present knowledge, not otherwise.

My plum trees have borne since the fourth year from the nursery. The fruit is seldom injured by the frost, and one year we had a very large crop of perfect plums,—and the last season a good crop, on trees most remote from the grove of wild ones. Further south, I learn that few escape the curculio, and that its cultivation is nearly abandoned in some places.

The Black Knots.—The wild plums and cherries are often much disfigured and sometimes destroyed by this affection; and I have observed that it is beginning to attack the blue and purple sorts in the orchard. We practice excision in this disease (which is not only hereditary, but may be propagated by contact and perhaps contiguity), and we are trying the effect of arsenic and corrosive sublimate as topical applications, and as alteratives, applied in a very *dilute state* to the roots and foliage. Our experience is not enough to determine the safety or value of this treatment, and we would not advise it, except in desperate cases, until after further and more successful trial.

We do not believe that this cutaneous disease is of insect origin, though we have frequently found grubs in the warts, which had evidently entered *after* their formation. For stocks, on which to work the finer plums, we are now testing a very free-growing, native sub-variety of the Prunus Americana, with large, yellowish fruit, and rich, semi-fleshy pulp. In spite of the curculio, plum trees are in great demand here, and owing to the high rates East, importations have been insufficient. But we shall soon have a supply of our own creation.

Of Cherries.—The cherry with us has been thus far the most uncertain of all fruits extensively cultivated. The whole State is liberally supplied with varieties of the Morello and the Kentish cherry, disseminated almost entirely in the shape of suckers. These are all hardy, and make a rapid and handsome growth, but are in general unproductive and worthless.

The class of Duke cherries is comparatively hardy with us, and they are usually good bearers, and the fruit excellent. The Heart and Bigareau cherries thrive well in the nursery, bear early, and excite hopes of a rich future, which some six or eight years at most, show to be utterly illusory. The tree is sometimes to all appearance merely "winter-killed"; at another, it dies gradually during summer, from extensive ulcerations or "sloughs" of the bark, on the south and west sides of the trunk and large exposed branches; but the greater part of these trees die suddenly, during the month of June, from a malady which commences apparently in the inner bark of the trunk—branches and roots being healthy—the latter sending up healthy suckers, and the former making good scions when cut in season. The greater part of my trees have died soon after showing their first flowers in the orchard—the foliage often withering as completely and suddenly as though the tree were divided from its root. In all these cases, even when there is little external sign of disease, the inner bark will be found discolored and gangrenous—much the same as in "frozen sap blight," with which we think it identical.

We can do nothing except in the way of prevention; and I am inclined to believe that the proper preventive is the one which best enables the tree to withstand the effect of our extreme and sudden alternations of heat and cold; and to do this we must retard and equalize the growth, and protect the susceptible trunk of the growing tree. For this I have found effectual low heads, a poor, dry soil, with early cultivation, as with the peach in the nursery; and if removed to a better soil in the orchard or garden, permitting a sod to form, and merely "forking," or hoeing a small circle in the spring only.

So far as we know, nature never voluntarily puts her subjects in *corsets*, this being the civilized barbarism of *reasoning* beings; still there may be much truth in the notion, and much good sense in the practice of Professor Turner and others, who advise stripping off the tough cuticle of the cherry, or dividing it by reversed spiral incisions extending from the branches to the ground.

The Quince.—The quince is as much at home in our deep rich prairie soils as the apple. We manure highly, and give a little salt early in the spring or late in the autumn. A friend of ours has had some very large crops of the Orange quince. This tree sometimes winter-kills, and is very obnoxious to attacks of the borer.

Nectarines and Apricots.—These fruits have scarcely been proved here. We lost the most of our trees last winter. Some friends have had better luck with their trees, but the curculio stings all the fruit.

The Vine.—Native grapes are everywhere abundant and prolific through this entire region. Besides the common "frost-grape" of the East, we have some excellent native varieties, producing beautiful clusters of large rich berries. I have two or three of these varieties from near the "Calumet," but which have not yet fruited in my garden. The principal kinds cultivated here are the Isabella and Catawba. In the middle of the State they cultivate an excellent variety, called the "Rhenish," supposed to be of European origin, though doubtful, I think; for I have never seen or heard of a well-authenticated case where a strictly foreign grape has produced like this, in the open border, in this country.

Our best grapes are all *native* ones, and foreign varieties have universally failed. The Catawba grape has appeared less hardy here than the Isabella, and both are occasionally winter-killed; the crop sometimes fails from late spring frosts, or is ruined by the mildew. Farther south, this last is their chief enemy, though I have heard of plague from the rose-bug. Still, I think the grape crop nearly as sure as the apple.

Gooseberries.—The native gooseberry succeeds to admiration, and is rendered larger and finer by cultivation; but out of Chicago, I have seen very few fine gooseberries of the cultivated sort; the mildew ruining the entire crop, which always promises well until attacked by this disease. In the city of Chicago I have annually seen the largest and finest crops of perfect fruit grown in their semi-alluvial, *sandy* soil, and am told that this fruit succeeds all along the lake shore; but everywhere from the interior, I have received the most discouraging accounts of mildew. Can the lake winds make this difference? Or is it in the soil?

Raspberries do well where the land is moist, rich, and partially shaded. Unless protected, some of the sorts are apt to winter-kill. Native sorts are found; the common black producing good crops; the red, so far as I have seen, is not productive. The *blackberry* is found everywhere in the timber, and bears finely. *Whortleberries* in variety; *cranberries*, &c., are abundant and productive.

Strawberries are met with in the open prairie, along the borders of the timber, and on the edges of "sloughs" or "saggs," where the soil is deep and moist; and the fruit is often large and fine, and was formerly abundant. Cultivation, the feeding of cattle, &c., and especially untimely fires, are destroying the native fruits, and we are just beginning to experiment with cultivated varieties, and with glorious success. Very fine specimens of

many choice sorts have been shown at our June fairs in Chicago, and that market has been reasonably supplied at fair prices.

Currants are here, as everywhere else in the same latitude, hardy, and abundant and uniform bearers. I do not remember that there has ever been a failure of this useful and cheap berry. Plenty of manure, and deep and good cultivation, render all the varieties large and fine; neglect will reduce the finest sorts to a level with the poorest.

I had intended to attempt a creditable report from our young and beautiful Prairie State, but I have delayed it for promised information until the "sickly season" is upon us, and I have written by snatches, when fatigued in body and mind by my hard duties of a "country doctor." I have had neither time nor inclination to select my words, or to arrange or revise my matter. My facts I believe to be, in the main, truthful, and the matter must go as it is, hoping that another year may be more prolific in statistics, and that my successors may have more ability and more leisure; more love for the subject, more enthusiasm, few can possess.

Before closing this paper, I must be indulged in a few remarks on a particular "hobby" of mine, viz:—

THE PROPHYLACTIC AND CURATIVE PROPERTIES OF RIPE FRUIT.

It has long been known to a few observing men, and now and then a writer has glanced at the fact, that fruits in season possess remedial virtues. Ripe grapes have cured epidemic dysentery. In vine countries they speak familiarly of the "grape cure." Physicians have occasionally ventured to recommend the use of "cooling acid fruits;" and the earliest writers have directed the sugary ones, as figs, for food in convalescence. But it is known to all, that many are prejudiced against fruits, and consider them as very *questionable luxuries* at the best. And it must be admitted that they have often proved mischievous, especially when immature, and taken by stealth, or in too large quantities when but occasionally accessible.

Thus, in ninety-nine cases in every hundred, it will be found that the *abuse*, and not the free use of fruits, has produced the mischief. Good fruits are always grateful even to the sickly or palled appetite; and in the young and the healthy, its promising appearance or its delicious aroma often excites the most ungovernable appetite, and they gorge themselves, and they suffer therefrom, no worse than from a surfeit of fish, flesh, or vegetables, perhaps, but still enough to aid in perpetuating the vulgar error that the unrestricted use of fruit is dangerous. Who ever heard of children or men who provide seasonable fruits in abundance, and permit their habitual use, eating too much, or becoming sick therefrom? I never did. I have had a little experience in this matter, and I have taken pains to collect information, and I *know* that the families where fruit is most plentiful and good, and most highly prized as an article of *daily food*, are the most free from disease of all kinds, and more especially from *fevers* and *bowel complaints*.

I have theories to account for this; but I love not theorizing, and will not inflict my crude notions on you at this time. I merely state the grave facts, and defy contradiction. I may add, however, that some fruits aid digestion, some directly, some indirectly, by restraining the appetite for more gross and stimulating food and condiments, by keeping the "bowels soluble," in

other words, acting as mild laxatives, &c. &c. The juicy ones act as "diluents," and all as "diuretics," the free acids neutralizing or rendering soluble the earthy matters in the blood, and carrying them off rapidly through the natural channels.

All this you can understand and appreciate. But let us glance at another phase of this universal remedy. It is the best, the cheapest, and the least exceptionable cure for *intemperance.* It not only lessens the desire for alcoholic drinks, but supplies their place, and removes their effects.

Eve was tempted by an "*apple.*" A good God has given us the object of "the primal sin," as a great blessing. If disease and death came from the eating of the forbidden fruit, health and length of days may be found in the assiduous cultivation and regulated enjoyment of that from which the interdict of the Creator has been taken, and which his open hand has lavishly scattered over the face of this fair earth.

I am, gentlemen, with sentiments of respect and esteem for you individually, and gratitude for the honor conferred upon me in this appointment, most sincerely your friend and humble servant,

JOHN A. KENNICOTT, *of The Grove,*
Chairman of the Committee for Illinois.

REPORT OF DR. HERMAN WENDELL, OF ALBANY,

CHAIRMAN OF THE COMMITTEE FOR THE STATE OF NEW YORK.

In compliance with the second rule of instruction to State Committees, which prescribes "that each member of a committee shall collect all the information in his power as to the value of various fruits in his particular section of State, and also as to the value of new seedling varieties," the undersigned, residing in the city of Albany, begs leave to report, that he has confined his observations mainly to the productions of the vicinity of that city, but occasionally to the character of particular varieties from other parts of the State. When writing of well-known fruits, it is deemed unnecessary to describe them minutely, because reference can always be made to standard works, and consequently it is only done when varieties of recent introduction or seedlings are under consideration.

Apples.—The specimens of this fruit which have been examined were grown at Greenbush in Rensselaer county, on a gravelly loam; at Niskayuna, about eight miles north of the city, in a sandy loam; at my own place, about a mile west of the city, on a sandy loam, with an admixture of clay, well supplied with lime, ashes, and stable manure; and also in a few instances from Columbia county, near Kinderhook, where the soil is a gravelly loam.

In all these several localities, I find that the yellow harvest, Sweet bough, Early strawberry, Baldwin, Roxbury russet, yellow and green Newtown Pippins, R. Island greening, Vandervere, Swaar, Esopus Spitzenburg, Fall pippin, Dominie, Westfield, Seek-no-further, yellow Bellefleur, thrive and bear large crops of fair fruit, and are not troubled with disease of any kind. The same is the fact at my own place—and some others in the vicinity of this city, where the soil is of similar character—with the Gravenstein, Rambo, Holland, Pippin, Herefordshire, Permain, Ladies' sweeting and Lady apple. My attention has been called to the Norton's Melon apple,

a delicious winter variety which originated in western New York in the vicinity where that valuable and favorite variety, the Northern Spy, was first discovered; when first disseminated, the Norton's Melon was said to be an autumn and early winter fruit, but specimens retaining their pristine appearance, juiciness, flavor, and consistence, kept without extra care, were eaten and examined by myself about the middle of February last; and the same has been done by several persons in Rochester, which proves the variety to be a good keeper, and consequently a more valuable one for general dissemination than was first supposed. A full description, with an outline, will be found in the transactions of the New York State Agricultural Society for 1848, to which I refer the Convention; also to the Wagener apple, which originated in Penn Yan, Yates county, New York. This was also until recently thought to be an early winter variety; but the experience of several seasons prove it to be, without extra trouble, a late keeper, and one which retains its juiciness and good character until March and April.

A full description, together with a beautiful colored engraving and an outline, will also be found in the same volume of the Transactions of the New York State Society. I will only add in relation to it, that all within the description referred to can be strictly relied upon, and that in my opinion it fully merits the praises bestowed upon it by the committee of that society. Also to a new seedling apple, to which I have given the name of Kingsley apple. This variety originated on the farm of Mr. Kingsley, in Pittsford, Monroe county, in this State.

This fruit has a peculiarly rich and agreeable flavor, an unusual supply of delicious juice, and is in eating order at a season of the year, without extra care, when very few other varieties are in good condition. The specimens from which the description was written were eaten on the tenth of June, and were as fresh and free from defect as when taken from the tree. This alone would entitle it to consideration, but, taken in connection with its other qualities, renders it well worthy of recommendation and name. The original tree is now growing in Pittsford; it is owned by Dr. Moses Long, who recently purchased the farm on which it stands, and to whom I am indebted for the above information in relation to its history, as well as for the fruit from which I have written the description.

My attention has also been directed to several other varieties of seedlings, none of which, without further information and trial, do I consider worthy of especial notice. Among those included in this notice are the Stannard grown by Col. Hodge, of Buffalo; a seedling grown by Thomas R. Peck, of of West Bloomfield, Ontario county; a seedling resembling somewhat the yellow Bellefleur, said to be a long keeper, received from George Bristol, Esq., of Oneida county; a seedling from Henry Snyder, of Columbia county; a seedling from Jacob Teller of Rensselaer county; one from J. D. Coe, Esq., of Seneca county, and one from De Ruyter, Madison county, called there the Enos apple.

Pears.—My attention to pears has been confined principally to those grown by myself on a sandy loam. I have a very large collection, many of them in full bearing; but a great number too young to enable me to judge of their qualities, as I consider it necessary, in order to enable us to form a correct opinion of the character of a variety, that the tree has age sufficient to give it vigor of constitution. The blight, that seriously felt destroyer of the pear in nearly all regions of our country, is as prevalent in the vicinity of

Albany as in any other section of the State; and notwithstanding some gentlemen have fancied that they had discovered that certain varieties were more exempt from its influence than others, I cannot bring myself to agree with them, because having been a close observer of the disease for several years past, in various sections of the State, I have seen it in all its virulence, destroying numbers of those supposed to be exempt, while those presumed, from their foreign origin, enervated constitution, or other cause, to be peculiarly liable to its attacks, were spared when growing in the same gardens or orchards. The cause of the disease seems to be as much a matter of dispute and discussion now as it was years since; scarcely two growers agree in their opinions in relation to it. I shall, therefore, take up no time in its discussion, but must be indulged in being allowed to recommend a course to cultivators, which, from analogical reasoning, seems to be rational and sound, and since the adoption of which,—whether from the plan pursued or accident, I do not pretend to decide—I have certainly suffered very little comparatively to what I did previously.

It is a settled and an undisputed fact, that persons as well as animals, when enervated in constitution from any cause, are more liable to the attacks of epidemic or contagious diseases than those not so circumstanced. Why may it not be the same with trees? Thinking that I had discovered blight to be either contagious or epidemic, (which I shall not as yet say,) from the fact, that when a tree was attacked, others in its immediate vicinity were apt to be affected in a similar manner, I determined to try what the application of crude iron-filings, to and among the roots, both when planting out and afterwards, would effect. Iron I knew to be a tonic, and that when applied in the form of filings or turnings, it could not injure, because it becomes oxidized gradually, and consequently but a given quantity would be taken into the circulation of the tree; therefore I applied it, and now, while trees of neighbors are badly affected with the disease, mine suffer but slightly. I, of course, do not depend upon this remedy, but the moment a tree is discovered to be attacked, that moment I amputate the limb far below the least appearance of disease. I am also careful that the blade of the knife is perfectly clean, and that it has none of the sap of a diseased tree adhering to it; because I have known many valuable trees destroyed by having been inoculated in this manner with the vitiated sap of a diseased tree. The well known and already described varieties which flourish, bear well, and are not attacked by disease, except the blight, in the vicinity of this city, are the Citron des Carmes, the Bloodgood, the Rosteizer (the most delicious summer variety with which I am acquainted), the William's Bonchrétien, the Flemish Beauty, the Beurré Bosc, the Doyenne Gris, the Muscadine, the Beurré Diel, the Duchesse D'Angoulême, the Seckel, the Gansels Bergamot, the Beurré de Capiaumont, the Bleeker's meadow, the Inconnue, the Van Mons, the Winter Nelis, the Beurré-gris d'Hiver nouveau, a very valuable variety in eating about January, the Louise Bonne de Jersey, on pear or quince equally well, and the Urbaniste. A large number of other less known varieties have borne in my collection on young trees and promise to be valuable additions, but before recommending them, I would prefer a few more seasons' experience; among them are Doyenne d'Eté, a beautiful and delicious early variety, ripe on the sixth of August this year, (1849;) the St. Dorothea, an autumn variety; the Belle et Bonne de Hee, an autumn variety; the Beurré Goubalt, an autumn variety and great bearer; Leon le Clerc Van Mons, a large and beautiful variety; the Compte de Lamy,

an autumn variety, and several others, a number of which were received by me with strong recommendations, are now under trial; several, I apprehend, will be discarded for want of merit, when more fully known. I have seen sufficient to induce me to cease cultivating the Easter Beurré on pear-roots, (on quince it is said to be better,) the Beurré Cadette, or Beauchamp, the Beurré de Louvain, the Beurré Knox, the Juliene, the Doyenné musque, and Nouvelle Mabille. The white Doyenne in most collections in the vicinity of Albany is nearly worthless, while in some it is as beautiful and valuable as in its palmiest days. The cause of this difference of character is probably owing to some deficiency in the soil; what that is, must be discovered either by analysis or experiment. I am at present engaged in various experiments to test the matter, and if successful in recovering trees on which the fruit borne has been diseased, I will communicate the fact in a future paper.

Stevens' Genesee Pear.—I embrace the present opportunity to correct an error in relation to the history of this valuable variety, into which the Fruit Committee of New York State Agricultural Society were led, during the winter of 1847, by a gentleman who professed himself familiar with the history of the fruit; and which is introduced in their report of that year, as well as published in the transactions of the society.

The Stevens' Genesee pear originated on the farm of Mr. Francis Stevens, of Lima, Livingston county, New York, and was introduced to public notice by Mr. Guernsey, of Pittsford, Monroe county, who gave it the name it now bears. A full history of it may be found in one of the early volumes, the 5th I think, of the Genesee Farmer, which may be relied upon as being strictly accurate, and to which I beg leave to refer the reader.

Plums.—The vicinity of Albany, having long been known as a region of the State in which plum trees have grown and borne fruit in great perfection, I may be expected to treat more voluminously of them than of some others. The soil apparently best adapted to the well-doing of this tree and fruit, being that which contains in it a large proportion of argillaceous matter, and as nearly every locality in the immediate vicinity of the city is well supplied with that ingredient, the reason of the success in the cultivation is very obvious. All varieties of hardy constitution grow well and bear abundantly, notwithstanding that pest to plum cultivators, the curculio, destroys every year a large proportion of the crop. Various remedies have been recommended for the protection of young fruit from its attacks. I would therefore recommend the growers to try such as they consider most rational, and communicate the result of their experiments to the public, through the horticultural journals of the country.

Plum trees are also with us liable to the canker or black-wart; the poorer varieties, and those of dark colors, are thought to be most apt to be affected with it. Planting on well-drained lands, thorough cultivation around the trees, and manuring them with lime, ashes, and a small quantity of salt, will, by the tonic effect induced, render them more likely to escape the disease than if left to themselves; but if the trees are attacked notwithstanding this course be pursued, free amputations of diseased limbs must be resorted to. The varieties which are cultivated, found hardy, and bear abundantly, are the Drap d'or, Reine Claude, Washington, red magnum-bonum, white magnum-bonum, yellow-egg, virgin, Coe's golden-drop, Nectarine, Prince's imperial Gage, Lombard, Lawrence's Gage, Bleecker's Gage, Deniston Red, Albany beauty, Mulberry, Buel's favorite, Jefferson, Peter's

large yellow, Columbia, Schenectady, Catharine, a delicious purple plum, equal to Reine Claude, fully described in volume 13th of Hovey's Magazine, and copied therefrom into the volume for 1847 of our State Agricultural Transactions,—Ickworth's Imperatrice, Coe's late red, Prune D'Agen for prunes, purple favorite, red gage, and a few others. The Prune Peche, or peach plum, is not sufficiently hardy to withstand our winters, as is the case with the Orange, the Rivers' seedling, so highly recommended by Rivers in a recent number of the Horticulturist, the Roe's autumn gage, the Bingham, the Fotheringham, the royal Hative and Louis of Orleans. The Waterloo, the king of plums, and the first importation of Reine Claude de Bavay prove to be Coe's Golden drop. This was predicted by Mr. Rivers, in relation to the latter, as some mistake had occurred with it by ignorant continental nursery-men; the second importation may be correct, and meet our expectations; it is now under trial.

Guthrie's Apricot Plum,—a beautiful variety, has fruited for the first time in Albany, this season, 1849. Its size varies from medium to large, its form is oval, but slightly flattened at either end, its exterior color is of a rich, lemon-yellow, with fine crimson dots around the stem, and on the exposed side; its texture is rather firm, but juicy and rich. The color of its flesh is yellow, its flavor is of an apricot character, its stone is small and adherent to the flesh, its stem is inserted in a narrow but deep depression. The color of the young wood is light greenish-red, its growth upright and quite thrifty, its season of ripening from the 25th of August to the 1st of September. It originated from seed planted by J. Guthrie, of Scotland, and as it proved to be hardy and prolific, and is also a handsome fruit, it may be considered by some a desirable acquisition; although its season of ripening is the same as many of the finer American seedlings, which far surpass it in size and deliciousness, as well as lusciousness of texture and juice. I myself do not consider it worthy of general dissemination, notwithstanding it well deserves a place in the amateur's collection. There are a large number of seedlings, possessing more or less of merit, some of them but very little inferior to many of the well-known varieties above named, growing in the vicinity of this city; but as the standard of excellence which new varieties must attain in order to entitle them to name or notice, is, that they are superior in some particulars to any now under cultivation, and as none of them come fully up to that high requirement, I cannot give them further attention.

Cherries.—Nearly all the finer and well-known varieties of the cherry are grown by cultivators in the vicinity of Albany; it, as well here as in other places, flourishes and bears best when grown in well-drained, warm, deep, and rich gravelly loam. As the varieties grown are all described in pomological works, and to which reference can be made, I will merely name those which bear fine crops and are the best fruits, viz.: May-duke, early white-heart, Belle de Choisey, black Tartarian, black eagle, Graffion or yellow Spanish, Elton, Elkhorn or Tradescant's black, Bigarreau, Couleur de Chair, Napoleon Bigarreau, Holland Bigarreau, Downer's late Red, Late Duke, Waterloo, and Wendell's mottled Bigarreau, a new, large, delicious, and late variety, recently grown from seed by myself, and which is fully described in the first volume of the Horticulturist, and the thirteenth volume of Hovey's Magazine. A large number of other foreign as well as native varieties are under cultivation, but a few years must elapse before their characters can be fully tested.

Peaches.—To the cultivation of the peach little attention is paid in the vicinity of Albany; owing to the vicissitudes of our winters, they are an uncertain crop and liable to destruction. I, therefore, do not consider it worth my while to devote any time to their consideration.

Apricots.—I have tried numerous varieties of this fruit, and found none of them, except the Breda, able to withstand many of our winters; it does, however, and I would recommend its cultivation to growers of fruit, as it is a delicious as well as beautiful variety, though small in size.

Nectarines.—The same must be said in relation to this fruit that I have said of the peach, as it is only in protected enclosures that they appear to do well; in such situations I would recommend the Boston and Downton, as varieties which will not disappoint growers.

Currants.—Several new varieties of the currant have been introduced to the attention of cultivators within a few years past, viz: The Knight's sweet red, of a beautiful red color, with large clusters and berries, and much more palatable than any other of the red varieties; the cherry currant having large and beautiful berries, but more acid than the above; the Victoria, a red variety, coming later to maturity than either of the above, and also more acid; the White Grape, of a greenish-white color, with long bunches and large berries, of the flavor of the old white Dutch, a desirable variety. The above new varieties, together with Black Naples—a large and very fine black variety,—the old Red Dutch, and the White Dutch, are grown in great perfection in our whole vicinity.

Raspberries.—The raspberry requires slight protection in order that it may withstand our variable winters; with such care and proper cultivation, it succeeds admirably. The best varieties grown are the Fastolff, the Franconia, and the White Antwerp; other varieties, as the Red Antwerp, the Victoria, the Beehive, and May's Giant, are grown to some extent, but are in my opinion inferior to the above. The Ohio Ever-bearing is a variety worthy of cultivation by the amateur; the berry is of a medium size, of bluish color and pleasant flavor.

Gooseberries.—The gooseberry suffers severely in some gardens with blight or mildew; various of the recommended remedies have been tried with more or less of success, but that course in their management which is most successful is to trench and manure the earth deep before setting out the plants, and then covering the earth around and under them with salt meadow hay. This course keeps the roots cool, allows them to penetrate deeply into the earth, gives the plant vigor to withstand disease, and the saline atmosphere which surrounds the bushes probably destroys the germ of the insect which is by some supposed to cause the mildew. A large number of varieties are grown in this vicinity, among the best of which are Sheba Queen, Lady of the manor, Lord Creve, Golden Walnut, White Eagle, Edward's Jolly Tar, and Woodward's Whitesmith.

Strawberries.—This fruit is grown extensively in the vicinity of Albany. The varieties mostly cultivated for market are, the Hovey's seedling and the Virginia scarlet. Nearly all the other valuable, or supposed to be valuable varieties, are grown by different individuals, and as the peculiarity of flavor in the various varieties is about as different as is the taste of different persons, most of them have their several advocates. I shall not attempt to describe, or even mention the names of the varieties grown, but will only allude to one or two of which much has been said. The Burr's new pine has fruited in Albany two seasons; it has proved to be hardy,

very prolific, and a very delicious variety. The other seedling of Mr. Burr possesses more or less merit, but the above is the best. The Aberdeen Beehive has fruited this season, 1849, in three collections; it is prolific when grown in single hills, but not more so than many others. The berry is of medium size, of very good flavor, but, taken as a whole, when compared with many other varieties, is unworthy of extensive cultivation. It is said to be valuable as a forcing variety; of this I have had no experience.

Grapes.—The only grapes cultivated to any extent without the protection of a grapery are the Isabella and Catawba; the first, being the earliest, is most certain to mature its fruit, but in order to insure a crop in other situations than the sheltered enclosures of our cities, it is necessary that they be protected during the winter months.

FARMING AMONG THE SIOUX INDIANS.

Saint Peters, Minnesota, 10 *Nov.*, 1849.

Sir:—I notice from the Patent Office Reports, that it is your wish to obtain all the information you can from the different parts of the Union, in relation to farming, &c. I do not find any thing from our newly sprung up Territory of Minnesota, and supposing you might not be displeased to receive some information from this part of the country, I have, with the assistance of a friend or two, collected such accounts of the agricultural means of our new Territory, as I suppose it would be desirable to make public. I have also sent you some account of the mode of cultivation among the Dahkotah (Sioux) Indians, with a list of the roots, &c., used by them as food, and a short description of their manner of procuring, cooking, and curing them for use.

When I first removed into this country in the winter of 1819–20, the Indians planted small patches of corn, digging the ground with a hoe purchased from the trader, or the branch of a tree sharpened. Their fields were from ¼ to 1 acre, the hills raised from 8 to 12 inches high, the top levelled to the size of 6 or 8 inches in diameter, and from 10 to 20 grains of a very small kind of corn were planted in a hill. The produce, ears of corn from 3 to 8 inches long, was mostly consumed as roasted corn, though some was boiled when green, the grain being then scraped off the cob, and dried in the sun. Thus cured, the corn will keep 2 or 3 years. When a dish of green corn soup is wanted in the winter, the Indians throw in a couple of handfuls of this sweet corn into a kettle of venison, and in half an hour they have a dish of fine rich soup.

Of wild roots there are several kinds that the Indians dig for food, when other food is exhausted.

1st. *Mendo, or wild sweet potato.*
2d. *Tip-sui-ah, or wild prairie turnip.*
3d. *Pang-he, or artichoke.*
4th. *Omen-e-chah, or wild bean.*

The first is found throughout the valleys of the Mississipi and St. Peters, about the bases of bluffs, in rather moist but soft and rich ground. The

plant resembles the sweet potato, and the root is similar in taste and growth. It does not grow so large or long as the cultivated sweet potato, but I should have thought it the same, were it not that the wild potato is not affected by the frost. A woman will dig from a peck to a half a bushel a day.

The Indians eat them, simply boiled in water, but prefer them cooked with fat meat.

The second (prairie turnip), grows on the high dry prairies, one or two together, in size, from that of a small hen's egg to that of a goose egg, and of the same form. They have a thick black or brown bark, but are nearly pure white inside, with very little moisture. They are met with 4 to 8 inches below the surface, and are dug by the women with a long pointed stick, forced into the ground and used as a lever. They are eaten boiled and mashed like our turnip, or are split open and dried for future use. In this state they resemble pieces of chalk. It is said that when thus dried they may be ground into flour, and that they make a very palatable and nutritious bread. Mr. Lamare Picot, a French naturalist, has lately incurred a very considerable expense to obtain the seed, which he has carried to France, believing that it is capable of cultivation, and may form a substitute both for potato and wheat.

The third (wild artichoke) is found in every part of the country where the land is rich and loamy, but particularly near fallen and decayed timber. It is a plant too well known to need further notice. It is eaten only by the Indians when in a state of starvation, from dread of its flatulent qualities.

The fourth (wild bean) is found in all parts of the valleys where the land is moist and rich. It is of the size of a large white bean, with a rich and very pleasant flavor. When used in a stew, I have thought it superior to any garden vegetable I had ever tasted. The Indians are very fond of them, and pigeons get fat on them in spring. The plant is a slender vine, from 2 to 4 feet in height, with small pods 2 to 3 inches long, containing 3 to 5 small beans. The pod dries and opens, the beans fall to the ground, and in spring take root and grow again. The beans on the ground are gathered by the Indians, who sometimes find a peck at once, gathered by mice for their winter store.

We have also several kinds of edible roots growing in the ponds or small lakes, and gathered by the Indians for food.

The *psui-chin-chah*, or *swamp potato*, is found in mud and water about 3 feet deep. The leaf is as large as the cabbage-leaf. The stem has but one leaf, which has, as it were, two horns or points. The root is obtained by the Indian women; they wade into the water and loosen the root with their feet, which then floats, and is picked up and thrown into a canoe. It is of an oblong shape, of a whitish yellow, with 4 black rings around it, of a slightly pungent taste, and not disagreeable when eaten with salt or meat.

The *psui-chah*, with a stem and leaf similar to the last, has a root about the size of a large hickory-nut. They grow in deeper water, and being smaller are much more difficult to get, but the Indians prefer them; they have an agreeable taste, and are harder and firmer when cooked. Both these roots are found in large quantities in the muskrat-lodges, stored by them for winter use.

The *ta-wah-pah*, stem, leaf, and yellow flower, like the pond-lily. It is found in the lakes, in water and mud, from 4 to 5 feet deep. The Indian women dive for them, and frequently obtain as many as they are able to carry. The root is from 1 to 2 feet in length, very porous; there are as

many as 6 or 8 cells running the whole length of the root. It is very difficult to describe the flavor. It is slightly sweet, and glutinous. It is generally boiled with wild fowl, but often roasted.

All these roots are preserved by the Indians for their winter use, by boiling, and then drying them in the sun or over fire.

The *wild rice* is another and very favorite article of food with the Indians. They use it in all their great feasts. It is found in lakes, where the mud and water are from 5 to 20 feet deep. The rice harvest continues only from 4 to 8 days; when ripe, the slightest touch shakes it off, and if the wind should blow hard for a day or two, the rice is all lost. The Indians obtain it by paddling a canoe among the rice, when, with a hooked stick, they draw the stem over the canoe, and then whip off the grains. They continue to push about the canoe, and whip off the rice, until the canoe is full, carry the cargo on shore, and return again; and so continue until the rice season is ended. To dry the rice, they erect scaffolds about 4 feet high, 8 feet wide, and 20 to 50 feet long, covered with reeds and grass. On these the rice is placed, and dried by a slow fire kindled under the scaffold and kept burning about 36 hours. The beard is longer than that of rye, and to remove it and the chaff, they make a hole in the earth about 1 foot wide and 1 foot deep, in which they place a piece of skin. About a peck of the dried rice is placed in this hole at a time, and an Indian steps in, and holding himself steady by a stake planted near, he commences half jumping, first on one foot, then on the other, and so continues until the rice is ready to winnow. It is then cleaned, and put into bags to be stored. Being of a dark color, the wild rice is not so good-looking as the Carolina rice, but the flavor is generally preferred. In preparing rice, the men take an active part. In gathering and curing all the other articles of food I have named, the women only are employed, and I believe that three-fourths of the food of an Indian family is thus supplied by the women.

In the settled parts of the territory, the only grains I have known raised are wheat, rye, oats, barley, and Indian corn. Spring wheat is an excellent crop, yielding in some extraordinary instances as much as 40 bushels, but upon an average 25 bushels per acre. Fall wheat has hitherto failed, from being winter-killed. In a few instances where it has escaped, the yield has been very great. In the year 1842, 4 bushels of winter wheat were put on 2 acres, the land adjoining a piece of standing timber. One acre was entirely destroyed and ploughed up in the spring; the remainder, next the timber, was left and harvested, and 54 bushels of clean wheat was the produce. Rye appears to answer well wherever it has been tried; it does not suffer as the wheat, and the yield has surpassed the expectation of all who have raised it, but I am not able to state accurately the amount per acre. Oats make a large return, and it is a general observation that they are vastly improved in quality when the seed is brought from below. 50 bushels per acre is a common crop; 6 acres have yielded over 300 bushels, when the oats could not be cradled, having been so much thrown down by a storm, and in mowing and raking the loss was undoubtedly very considerable. The weight varies from 34 to 45 lbs. Barley is also a very profitable grain; 60 bushels per acre may be calculated on, although that amount has been obtained from less than $\frac{2}{3}$ of an acre. Of Indian corn we have at present raised but two varieties; one, a large white 8-rowed kind; the other, a small white corn, which is only valuable from ripening so very early. The largest crop of the first kind produced here gave 90 bushels to the acre, the

corn being weighed after it had been stored in the upper chamber of a house until it was very dry. Of this corn, I believe an average crop yields 50 bushels and upwards, whenever it escapes the ravages of the blackbirds. The smaller corn I have known planted after the 10th of June, and perfectly ripe at the end of August. It yields 30 bushels to the acre.

At present no manuring of the land has been necessary, and throughout the whole Territory the crops I speak of have been raised with very little preparation or culture.

Both climate and soil are particularly favorable to root crops. Potatoes are of a very superior quality, and appear to surprise all who arrive here from other parts of the United States, both by their quality and quantity. I am only able to state the amount per acre of one yield—it was a piece 3½ acres—the potatoes were of two kinds, the Irish gray and a dark-blue kidney; planted in hills, but not earthed up, and only once hoed; the produce 450 bushels per acre.

The rot visited us first in 1845, and has not yet disappeared. It has been observed to affect the potatoes most in moist lands, and has seldom attacked the plant in entirely new land. It has not injured the firm-fleshed potatoes so much as the tender ones, such as the Meshannocks. I believe it to be caused by the state of the atmosphere, as I have observed the plant to be attacked generally after very heavy dews.

Both the white turnip and ruta-baga answer well, but I am not aware of any one having ascertained the amount produced per acre. Where the ruta-baga has been sown broad cast, it has seldom been touched with the hoe, and yet I am of the opinion the roots will average seven pounds each, and that 700 to 800 bushels have been gathered from an acre. Every kind of the ordinary garden vegetables is grown in great perfection.

But the farmer in Minnesota Territory has still greater prospect of profit from raising cattle. During the years I have lived here, I have found no disease prevailing; the horn-ail occasionally occurs, but not near so frequently as in other parts, which I attribute to the even and dry nature of our winters. The wild feed appears to be singularly fitted to fatten cattle during the summer months, and to sustain them during the winter.

Wherever rushes can be found in sufficient quantity, it is quite unnecessary to prepare any other winter feed. Oxen will not only keep fat, but rapidly fatten on them during the winter, and, contrary to the general impression, I can vouch for it that they will stand work in the winter on the same feed. During the summer and fall, nature has provided the best kind of food for cattle, for they certainly fatten more upon the run than by any artificial feeding I have known. A case has been stated to me, when after breaking and planting with a yoke of oxen and a yoke of four-year old steers, the steers were turned out in very poor condition on the 20th July. In October one of them was slaughtered, and gave 910 lbs. of beef to the 4 quarters, and 120 lbs. of rendered tallow. A two-year old buffalo bull, also slaughtered off the run, and not at the best season, viz: in September, yielded 450 lbs. of beef to the 4 quarters.

A long residence in the country of some of the Indian traders, with an opportunity of observing many horses, has enabled them to state the singular freedom from disease of this animal. Instances are frequent of horses finding their own living throughout the winter, and doing well.

Hogs have only been introduced into the country since it was purchased of the Indians and began to be settled. The importation of a Hampshire

boar, and subsequently of a Byfield, and then a Berkshire, has contributed to form a very valuable breed; not too tender for the climate, and with tendency to fatten derived from the last two varieties, rendering them a profitable kind for this country. However, pork raising will never become a business in which we can compete with the farmers of Illinois, Indiana, or Ohio. Hogs of 18 months or 2 years seldom fatten over 250 lbs.

Very few sheep have been brought into the country, although the little experiment that has been tried with them was very promising. The sheep were brought from Missouri, and rapidly improved both in size of carcass and quality and quantity of wool. They wintered without any extra care, and had no sickness. The same observation was made of a small flock of about 200, which was kept by an Indian trader on the St. Peter's river, 350 miles from this place. During several years they never suffered from any disease, and had no wintering but the wild hay cut for his horses and cattle. From the sheep brought from Missouri, which gave $3\frac{1}{2}$ to 4 lbs. of wool in Missouri, those raised here, at three years old, yielded $7\frac{1}{2}$ to 8 lbs.

An agricultural society has lately been formed here under the advice of the governor and sanction of the legislature, and should you think this distant Territory worth notice, future years may furnish more important details.

I am sir, yours very respectfully,

PHILANDER PRESCOTT,

Superintendent of Farming for the Sioux.

To the Hon. Commissioner of Patents, Washington.

WHEAT *vs.* CHEAT.

Richmond, Wayne Co., Indiana, 4*th mo.* 14*th*, 1850.

Esteemed Friend:—My only motive in writing to thee is to correct as far as I can, a most mischievous statement of a correspondent of the former Commissioner in his Report for 1848, p. 471, in which an account is given of an experiment in growing *cheat.* He says: "From which I infer that there is no danger to the farmer from a reproduction of cheat, that may inadvertently be sown with wheat, and that cheat is nothing more nor less than degenerated wheat." Now I will venture to think, at least, that the cheat sown was not sound, or it would have grown as well as any other grass-seed.

Upwards of 40 years since, I was present when this subject was largely discussed (and not very far distant from the residence of this correspondent), the one contending that it was degenerated wheat, which turned to chess; the other more rationally maintaining that it was of the family of grasses, and would grow.

As soon as they left I went to the barn, and got about a gill of chess-seed, which I sowed carefully in the garden: and I venture to say that a more luxuriant crop was seldom seen from the same amount of grass-seed, and as far as my close observation and experience go, I am prepared to say that chess-seed will grow, and that wheat will not turn to chess.

I regret that an opinion so mischievous in its consequences should have so large a circulation as this has through the Commissioner's Report. It is

certainly calculated to make the careless and unobserving farmer more careless. However, I readily admit there are, or used to be, portions of Montgomery county that would not grow cheat, nor any other grass.

I think it would be safe to say that our wheat crops never looked more promising than at this time, for the last 30 years, though the spring has been remarkably dry and cold.

Sincerely thy friend,
JOS. P. PLUMMER.

Hon. Thomas Ewbank,
Commissioner of Patents.

CULTIVATION OF FLORIDA TOBACCO.

Washington, *April* 15*th*, 1850.

Dear Sir:—I inclose you a letter upon the culture of the Florida tobacco. This tobacco is sold in market at a price varying from fifteen to seventy-five cents a pound, and occasionally I believe a higher price has been obtained.

I also send you a diary of meteorological observations at St. Augustine, made during the last winter, which may be interesting to you. St. Augustine is in the northern part of the Peninsula of Florida. The peninsula extends into a latitude entirely beyond the region of frost. Altogether the best sugar and sea-island cotton country in the United States is on that peninsula. The lands are very fertile, and at present cheap; the climate agreeable and healthy, and the facilities of water communication with market very good.

Respectfully your obedient servant,
D. L. YULEE.

Annexed will be found the valuable communication on the culture of Florida tobacco, referred to in the above note of the Hon. D. L. Yulee.

We are also indebted to Mr. Yulee for a copy of a letter from the U. S. consul at Oporto on the culture of the olive, a fruit which can doubtless be successfully cultivated in Florida and other Southern States.

Ocola, Marion Co., Florida, *March* 10*th*, 1850.

My dear Sir:—The peculiar character, as well as the high price obtained for Florida tobacco, has lately created a great deal of inquiry as to the proper method of its cultivation.

At your request I will undertake to give you such practical remarks as will, I hope, enable you to successfully grow the plant; together with some ideas adapted to its housing and preparation for market.

The object in cultivating "*Florida wrappers*" is to produce an article that will command the highest price *per pound*. To do this, select your seed with care. The "Long Green" and "Pear Tree" are preferable to any other. These varieties *spot* better, and produce a finer leaf than any I have ever seen. When brought to perfection, the leaf is of a bright cinnamon

color, having thousands of small white spots covering the surface. These spots it is that gives character to the tobacco, for without them the article is comparatively worthless.

Plant Beds.—Select for your plant beds a natural rich loam, a warm spot, always moist, without water lying on the surface, and where it can have the benefit of the sun. Upon this piece of land, say 15 feet long by 9 feet wide, pile brush about waist high any time during the winter, taking care to have the edges of your piles higher than the centre; burn off some dry day about the 1st of March; after the burning of the brush, and as soon as the spot is cool enough, dig deep with a grubbing-hoe; cut and chop out every root, no matter how small; in fact, leave nothing but the mellow earth, well pulverized; rake off nicely with a fine rake, and your bed is ready for the seed. To be certain, however, of a full supply of plants, it is advisable to have more than one bed. Those having most experience plant every two weeks, commencing about the middle of February and planting the last about the middle of April. It is better to have several beds too many than to fall short 100 plants.

To plant the Seed.—For a bed of the size mentioned, mix a table-spoon even full of seed in about a quart of sifted ashes; sow in the same manner as your turnips or cabbage seed, regulating your hand to the size of the bed and quantity of seed; rake them in with a fine rake and tramp your bed in every direction, until it is compact and firm; rake level and sprinkle with water: if this is properly done, it is not probable that grass or weeds will trouble you; should they, however, they must be carefully pulled out.

The cut-worm is generally the first enemy to attack tobacco, and it is likely you will find them in these beds. A shower of soap-suds from your watering-pot will drive them from their hiding places, when of course you will destroy them. The soap-suds is also an excellent manure, and, with a slight sprinkling of ashes immediately after, will drive off the flea or fly, a small black insect that perforates the plant, and sucks from it all nourishment, leaving it to wilt and die in the bed. Be careful that you do not allow your plants to crowd too much in the bed. After they have attained sufficient size for transplanting, and you are not ready, or if it is too soon, pull them up, and let others take their place. When they have attained their sixth leaf they are about the right size to transplant.

Second Culture.—New land is always planted with us. Rich, gray hammock is best adapted, although pine land, if of a sandy loam and lightly cowpenned, answers well, if not too flat. (In my directions to you, however, I am treating of hammock land entirely, and arranging for a crop of two acres.)

It matters little whether you select a level or *undulating* piece of land, only be particular that it is not liable to drown, or *wash much*, during the heavy rains of summer.

Having selected a desirable piece, you commence at any convenient period of the winter:—First, by cutting all the undergrowth in a regular manner, falling it such a way as to cover as equally as possible the whole surface intended to be planted; next, your small trees, and lastly the larger ones, which cut into convenient lengths for log-rolling or rails, as you may desire, lopping the tops so they will burn.

Experience has proved that the best tobacco is obtained from plants set out in the month of May; it is therefore advisable so to arrange your labor as to do all your transplanting in that month.

Presuming the timber has been levelled as required, about the middle of April burn it off and roll the logs not burnt. These you can set fire to again, or permit them to remain. If you set fire to the log-heaps, the earth beneath them will be too much burned to produce vegetation of any kind; if they remain, the ground they occupy of course cannot be planted. After burning off, and all trash and brush is raked off, plough up your land, cutting and tearing out as many of the roots as possible. These roots should be carried off or burned. Next check the land by running furrows three feet each way. The grubbing-hoe is the next article required.

A good strong hand should commence in the cross of the angles and dig out all the remaining roots and loosing up the earth for the hill; a weaker hand may follow, making a large flat hill with a depression in the centre, that the water may find its way and be retained near the roots of the plant. I would again go over this land with a hoe, cutting off all projecting roots or sticks, as well as to rake out the trash thrown from the newly-made hills, which, if left in the field, will harbor many grasshoppers and other insects, enemies of this plant. Besides, if you leave small roots or sticks projecting out of the ground, you will find they tear and bruise the leaves after they begin to grow and receive the wind. This is of importance, for recollect that the smallest puncture (of a pin, for instance) in a young and tender leaf will be a hole when the leaf is grown that you could readily pass an ordinary quill through, and as your object is to raise an article *for wrappers*, a defect of this character, if extensive, would be fatal to the profitable sale of the crop.

We have now reached the transplanting season, which is the first of May (a few days earlier or later is not material), if you have showers or "seasonable weather," but do not wait for them—rely upon your watering-pot and a bunch of moss or palmetto leaf to protect the plant. The plants should be carefully taken from the seed-beds, by pulling them up and placing them in baskets, using great caution not to bruise the main stem or break the leaves. Plant one stock in a hill erect and about the same depth it stood in the bed. To do this properly, take the plant in the left hand and with the right scoop out from the centre of the hill sufficient earth; set the roots of the plant in the hole, and cover, pressing the dirt gently but firmly around it, after which pour on about half a pint or pint of water; this settles the earth compact and firm, and gives you an assurance that the plant will live. Do this work well, and be careful in doing it, else you have had your trouble for nothing. A sickly plant requires more care than a flourishing one, and in the end generally dies after it is too late to replant. Green moss is better than any thing I know of for covering and protecting them from the sun, as it retains moisture during the day, and keeps the ground cool around the roots. It should remain on four days, taking it off in the evening. A small handful laid over the plant, and water sprinkled on it, will insure the plant to live, provided the cut-worm does not interfere. In about ten days after transplanting, hoe out what weeds may have sprung up, and draw a little earth to the plant, making a small hill. It requires no other working.

Up to this time I have only alluded to worms; now it is necessary to mention them particularly, as they appear by millions, having different forms, and attacking the plant in various ways. Let me mention them in the order in which they attack the plant.

1st. The cut-worm commences its depredations in the seed-bed, nipping

out the bud, or cutting the plant off at the ground. It also eats into the main stem after you have transplanted.

2d. The bud-worm attacks after transplanting, preying upon the tender bud, which it will destroy in a short time if allowed to remain.

3d. Black-head, or glow-worm, appears to breed in the leaf, eating its way in every direction, leaving little else than the stems and epidermis.

4th. Green-worm, about the size, and resembling the black-head; it eats along the edges of the leaf and stems, curling the leaf and hiding in them.

5th. The horn-worm is deposited on the smooth or upper surface of the leaf in an egg by the tobacco-fly, hatches out, eats through at once, and continues to eat until the whole plant is destroyed. This worm makes its appearance about the 20th of May; from this time forward you must use the utmost diligence in destroying them. Begin in time—hunt the eggs as well as worms, going over each plant once a day; to do which you must add to the force heretofore required, if necessary.

I cannot enforce upon you sufficiently the necessity of paying the strictest attention to this business. By vigilance you prevent the worm from doing much harm. If you relax for a day, you cause great trouble and loss.

The green and "black-headed" worms you also kill by simply pressing the leaf between the thumb and forefinger. With the bud-worm you must be more particular, as you are apt to destroy the bud of the plant in killing it. An unskillful hand at this business does almost as much harm as the worm; for the slightest bruise or least piece pinched off in taking the worm destroys at least half the leaf so mutilated. The cut-worm has already been spoken of; and although a great deal more could be said while treating of these (the greatest enemies of tobacco), it is only from experience you can ascertain with what you have to contend.

The plant will indicate to you when it has attained its growth, by forming at the top a gem or button, which if left will throw out a number of delicate flowers; finally forming great quantity of capsules containing the seed. Select a few of your best stalks for seed, and top the rest of the crop. This is done by breaking off the button soon after it is fairly formed. If your plant shows a diminutive growth, top lower than the button by several leaves, which will increase the size of the remaining ones.

From this time forward you must attend closely to breaking off the suckers, and allow nothing to interfere with the proper development of the leaves on the main stem. In about two weeks after the button is taken off, you will find the leaves near the ground beginning to ripen and spot. Do not mistake the scorched and dried up "ground leaves," for ripe and mature tobacco, for as a general thing they are not worth saving, and had better be thrown away. At times, however, we find some very pretty ones among them, which should be properly cared for.

It will not be long now before the whole stock (except the younger leaves at the top) begins to assume a lighter cast of green, and also to be studded thickly with fine white spots. Now is a time of great solicitude, and every thing that tends to mar the operations of housing and curing is truly vexatious. Let there be plenty of house-room, and have no lack of sticks. The leaves should be broken from the stalk as they ripen, and placed upon hand-barrows, or some other convenient mode of transportation, and taken to the house without being wilted in the sun. In the house they are split down the stems about four inches; then strung upon sticks, placing two leaves with their backs together, and thus continue until the stick is full, leaving a

space of one and a half or two inches between each leaf, according to their size; the largest requiring the most room. The stick being full, place it upon the rack made to receive it.

Much time will be saved in the end by assorting the tobacco while splitting it; making at least three classes, having reference to the size of the leaf, quality, and the injury sustained from the worms. In placing your sticks upon the racks do not crowd too much at first, let the leaves barely touch, after it has united close a little, and continue to do so during the drying process; until, at last, you may bring the sticks within an inch of each other.

Let me mention the horn-worm once more. They are frequently overlooked in gathering and splitting; after the tobacco has been housed three days it is well and many times important to go over it again, and take off all you may find; recollect that "one worm in the house does more harm than ten in the field."

The next thing to consider is the house and its arrangements. A house thirty feet square and ten feet high is deemed sufficient to house two acres of tobacco. In a building of this size, you would want six rows of stalls, made of pine poles, with the bark taken off, and sufficiently strong to bear the weight of a man, placed about two feet apart, one above the other, to the roof of the building, leaving a space on the side where the door is, of about 6½ or 7 feet, that the person with a stick filled may pass or repass. Besides it will afford room to split the tobacco, &c., though a shelter outside would do better for this last business. Your racks being up, you must make your sticks conform to the width of the aisles; therefore make your sticks five feet two inches in length. These you can make from pine laths about ½ inch in diameter, smoothed off with a drawing-knife, with one end tapering, but not sharp. The two extra inches are given that they may have sufficient length to sustain a jar or jolt without falling. In the uprights of the racks, or any other convenient place about the building, bore with a ¾ inch auger a hole about three inches deep; in this hole place the large end of a stick, and you will find a firm and suitable support while stringing the leaves thereon.

Do not place the tobacco too close to the ends of the sticks, as in moving it about and sliding it on the rack, you are apt to tear or bruise the outside leaves. About forty leaves are enough to put on one stick.

When your tobacco is cured and ready for boxing, the stem of the leaf will be perfectly dry, and in clear weather quite hard. After you ascertain this, you may at any time when it is in case, commence taking down stick by stick, and as you take off the leaves assort again, making several qualities, having reference now to the manner and color it has cured. Have convenient a box for each class, and as you take it from the stick, "hand it up," that is, tie it in bundles. A bundle is formed by taking about the same number of leaves as was on the stick, and wrapping a leaf around the handful at the upper part or stems, making a band about two inches wide, tucking the end in the bundle by way of confining it. After it is made, place it in its proper box with the butts out; when the box is full, you may with a light lever power gently press it. Be careful that you do not pack too hard; after which you may fill in again. These boxes must be examined occasionally, to see that they do not overheat. This can be done by running the arm down the side of the box, and working your hand towards the centre. If you find the tobacco getting too warm, instantly unpack, when, in a few minutes, and without much trouble, you may replace it.

Tobacco, when put up in too high case, is apt to heat: this must be avoided, as it rots the leaf and makes it unfit for the purposes for which it is purchased.

Many persons "bulk" their tobacco, which is done by simply putting it in winnows on the floor, allowing it to go through a sweat before it is boxed. This however requires more judgment and neatness than I have ever seen practiced; besides, when put in winnows this way, it frequently goes out of case, in which case it is impossible to touch a leaf without crushing and breaking it to pieces. For these reasons I prefer boxing at first; for then you are able at any time to work with it and have your crop in market at a much earlier period, which is a decided advantage, as you will readily learn.

I advise you to bestow much attention to your last packing; see that your tobacco is as near one quality as possible, and as you value your interest do not allow a superior article to go on top, while at the bottom it is quite inferior.

In conclusion, I must say that I feel a great deal of diffidence in offering you these remarks. My experience is not sufficient to warrant a faithful observance of the mode of culture here adopted. Several planters of more experience, intelligence, and observation than myself, prefer planting, for instance, two and a half feet one way and three feet the other, and give as a reason, that it is more convenient, while the plant is less liable to injury during the time the hands are employed in mowing it. This may be the better distance, but my opinion is that the plants being equi-distant present more uniformity of size. Satisfy yourself upon this subject.

If I have made any thing obscure, on intimation I will endeavor to explain.

With much respect,
Your obedient servant,
JOHN G. REARDON.

To A. H. Cole, Esq.
Baywood, Florida.

CULTURE OF THE OLIVE.

Oporto, *January 22d*, 18 ——

Esteemed Sir:—In a recent excursion to the Algarves, where orange trees are more cultivated than in these northern provinces, I had occasion to notice a remedy used by the farmers there to cure the trees affected by the *Ferrugen*, or to prevent its attacks.

They wash the trunk of the tree all around, for the length of a foot, with a mixture of lime, potash, and oil, or soap. I was assured that this simple preventive had greatly diminished the destruction caused by the insect.

Thinking this information might be of some service to you, I take the liberty of communicating it without loss of time. I would also respectfully call your attention to the cultivation of the olive in Florida and in most of the Southern States. Formerly the olive, on account of its slow growth, was not considered very useful; but some years since a new variety was introduced into France, and into some parts of Spain and Portugal, which yields an abundant crop of fruit the second year after planting. They are small trees, or rather shrubs, about four or five feet high. The fruit is

larger than the common olive, is of a fine green color even when ripe, and I am informed, contains a great deal of oil. The advantages accruing from this new mode of cultivating the olive tree, are beyond all calculation. By the old method, an olive tree does not attain its full growth, and consequently does not yield any considerable crop, under thirty years; whereas the new system of cultivating dwarf trees, especially from cuttings, affords very abundant crops in two or three. An acre of land can easily grow 2500 trees of the new variety, and the gathering of the fruit is easy, as it can be done by small children.

I am proud of being one of the first to introduce into the United States the culture of silk, which would certainly be more advanced, if the frantic speculations in *morus multicaulis* had not spoiled the business and deluded many good farmers.

As the cultivation of the olive does not require the least practical knowledge, and as every one in the States understands the process of making oil, I would be most happy to forward, by all means in my power, whatever your patriotic views might suggest on the subject. I should think that good olive bushes, well rooted, and with good heads, might be had here at from 18 to 22 cents each.

With sincere wishes for your prosperity and constant happiness, I remain, esteemed sir,

Your most humble and obedient servant,

L. W. TINELLI,
U. S. Consul.

Hon. D. L. Yulee,
Washington, D. C.

CULTURE OF BROOM-CORN, AND THE MANUFACTURE OF BROOMS.

The following article is from the pen of Sanford Howard, Esq., favorably known as one of the editors of the Albany "Cultivator." The production of broom-corn is rapidly extending, and corn brooms are driving *broom-sedge*, as an article for sweeping floors, out of every humble dwelling in the Union.

"Having a few hours to spend at Schenectady about the first of September last, our friend, Mr. Charles H. Tomlinson, kindly accompanied us to several places in the vicinity, and among the rest to the broom manufactory of Messrs. Van Eppes. They have been engaged in the business about eleven years. They have a farm of about 300 acres, 200 of which are Mohawk flats. A large portion of the flats was formerly of little value, in consequence of being kept wet by a shallow stream, which ran through it, and which, together with several springs that issue from the sandy bluff on the south side of the flats, kept the ground marshy, and unfit for cultivation. By deepening the channel of the stream, and conducting most of the springs into it, many acres, which were formerly almost worthless, have been made worth $125 per acre. They have also, by deepening the channel, saving the water of the springs, and securing all the fall, made a water privilege, on which they have erected an excellent mill, with several run of stones, leaving

besides sufficient power to carry saws for cutting out the handles of brooms, &c.

"They have this year about 200 acres of the flats in broom-corn. The cultivation of this article has within a few years been simplified to almost as great a degree as its manufacture. The seed is sown with a seed-barrow or drill, as early in spring as the state of the ground will admit, in rows 3½ feet apart. As soon as the corn is above ground, it is hoed, and soon after thinned, so as to leave the stalks 2 or 3 inches apart. It is only hoed in the row, in order to get out the weeds that are close to the plants, the remaining space being left for the harrow and cultivator, which are run so frequently as to keep down the weeds. The cultivation is finished by running a small, double mould-board plough, rather shallow, between the rows.

"The broom-corn is not left to ripen, as formerly, but is cut while it is quite green, and the seed not much past the milk. It was formerly the practice to lop down the tops of the corn, and let it hang some time, that the brush might become straightened in one direction. Now, the tops are not lopped till the brush is ready to cut, which, as before stated, is while the corn is green. A set of hands goes forward, and lops or bends the tops to one side, and another set follows immediately, and cuts off the tops at the place at which they are bent, and a third set gathers the cut tops into carts or wagons which take them to the factory. Here they are first sorted over, and parcelled out into small bunches, each bunch being made up into brush of equal length. The seed is then taken off by an apparatus with teeth, like a hatchel. The machine is worked by six horses, and cleans the brush very rapidly. It is then spread thin to dry, on racks put up in buildings designed for the purpose. In about a week, with ordinary weather, it becomes so dry that it will bear to be packed closely.

"The stalks of the corn, after the tops have been cut off, are five or six feet high, and they are left on the ground, and ploughed in the next spring. It is found that this keeps up the fertility of the soil, so that the crop is continued for several years without apparent diminution. It should be observed, however, that the ground is overflowed every winter or spring, and a considerable deposit left on the surface, which is undoubtedly equivalent to a dressing of manure.

"This may be inferred from the fact that some of the flats have been in Indian corn every year for forty or fifty years, without manure, and with good cultivation have seldom produced less than sixty bushels per acre, and with extra cultivation, from eighty to ninety bushels have been obtained.

"In case of need, the stalks would furnish a large amount of good food for cattle. They are full of leaves which are very nutritive, and whether cut and dried for winter, or eaten green by stock turned on the ground where they grow, would be very valuable in case of deficiency of grass.

"Messrs. Van Eppes employ twenty hands during the summer; and in autumn, when the brush is being gathered and prepared, they have nearly a hundred, male and female. They are mostly Germans, who come here with their families during the broom-corn harvest, and leave when this is over.

"The manufacture of brooms is carried on mostly in the winter season. The quantity usually turned out by Messrs. V. E. is 150,000 dozen per annum."

ACKNOWLEDGMENTS AND CORRESPONDENCE.

The acknowledgments of the Office are due to the following gentlemen in China and the East Indies, for their kindness in collecting and forwarding to the Patent Office valuable seeds, pamphlets, &c., which have been distributed, through members of Congress and others, among intelligent agriculturists in all parts of the country:—

Hon. John W. Davis, U. S. Com. to China; Dr. D. J. Macgowan, Ningpo, China; Rev. E. V. Bridgeman, Shanghai; J. Balestier, Esq. U. S. Envoy to South-Eastern Asia; Charles Huffnagle, Esq., U. S. Consul, Calcutta; S. Wells Williams, Esq., Canton (*see letters*); Dr. B. McCartee, Ningpo.

Legation of United States, Macao, China, *June 6th*, 1849.

To the Hon. Commissioner of Patents.

Sir:—I send herewith, per American ship "Virginia," another box of seeds, and ask your attention to the two letters inclosed, as explaining the contents of the box. I hope to be able to forward another parcel in a few months.

Very respectfully, yours, &c.

JNO. W. DAVIS.

Canton, *June 1st*, 1849.

Hon. J. W. Davis, Macao.

My dear Sir:—I send you a box of seeds for Mr. Burke, inclosed first in tin and then put in the wooden box. They are from Ningpo and Canton, those from Canton being marked, and the others having been forwarded by Dr. Macgowan from Ningpo. I hope they will arrive in Washington in good order. I have a note from Mr. Johnson at Fuhchaufú, who promised to send me some in the autumn as he colleots them, as that will be in time to reach the United States in 1850. If those from Dr. McCartee reach me soon, I will have them packed up like this box.

Yours truly,

S. W. WILLIAMS.

Ningpo, *Feb. 20th*, 1849.

Mr. S. Wells Williams.

My dear Sir:—I forward herewith a few specimens of seeds, &c. from Ningpo, which I beg you will do me the favor to forward to his Excellency the United States Commissioner, agreeably to the request contained in your letter, which Dr. Macgowan handed me in December last. I am sorry that the quantities are so small; but the lateness of the season made it difficult to procure specimens of seeds; the people being unwilling to spare from

their own stock. The proper way is to bespeak seeds beforehand, and have a certain quantity saved from each crop as it is gathered; but this would require nearly a year to make a full collection. I have sent by this opportunity what I have been able to collect, and shall endeavor to make a better collection during the present year. Dr. Macgowan has informed me that he has already sent a collection to the Patent Office, so that the scantiness of the specimens now sent is not a matter of so much importance. The only manure used about Ningpo in any quantity is night-soil or human ordure. Urine is used as a manure for the poppy in the neighboring department of Táichau, where the opium is manufactured called Táichau-tsiang, or Táichau-jelly. Ashes are here used also, but the quantity is not very great. Chicken feathers are collected to be used as a manure for sugar-cane, which is grown in Shanhing-fú, and also in Fanghuia district in this department. Clover is sown and turned under as a green manure for the paddy. I should have mentioned that the sugar-cane is eaten here in substance in the summer, and that no sugar is manufactured from it. Excepting paddy, every thing is planted or sown in drills about ten inches apart, and manured as in a kitchen garden with us. Indian corn, tall millet, and the different kinds of *brassica*, &c., are transplanted after they have attained the height of four or five inches. I subjoin a list of seeds sent.

I remain, very truly yours,
D. B. McCARTEE.

1. Early rice.
2. Late rice.
3. Glutinous rice.
4. Indian corn.
5. Tall millet.
6. Low millet.
7. Wheat.
8. Barley.
9. Buckwheat.
10. Vegetable tallow-tree seeds.
11. Pods of the soap-tree.
12. Cotton seeds.
13. Benne (*sesamum orientale*).
14. Chinese annual hemp.
15. Brinfall, or egg-plant.
16. Pumpkin.
17. Cucumber.
18. Vegetable marrow, (gourd).
19. Tricosanthes, or snake-gourd.

20–26½. Eight species of beans planted about the 5th April. Except Nos. 20 and 26, which are planted about January and July respectively.

27. Marigold greens.
28. Mustard seed.
29. Winter coarse greens, planted about Sept. 8th.
30. Winter cabbage, planted Sept. 8th.
31. Bulbous-root cabbage Nov. 8th.
32. Brassica, from the seeds of which oil is made, Nov. 8th.

33–35. Three other specimens from the same family.

NOTE.—The above seeds have all been distributed from the Patent Office during the present season.

LEGATION OF UNITED STATES,
CANTON, CHINA, 17*th Dec.*, 1849.

SIR:—I send you by the American ship "Tzar," that leaves this port to-day for New York, a box of China fruit-seeds directed to you, and also inclose herewith a letter received from Mr. Williams, under whose direction the seeds have been procured and packed.

These seeds will be found best adapted to the Southern portion of the United States.

I have the honor to be very respectfully,
Your obedient servant,
JNO. W. DAVIS.

Hon. THOMAS EWBANK,
Commissioner of Patents, Washington.

CANTON, *Dec.* 14*th*, 1849.

Hon. J. W. Davis.

SIR:—At your request, I have put up for the Patent Office the following seeds of fruit trees growing in this vicinity; they were gathered during the summer and autumn, and have all been dried in the sun.

OLIVE (*canarium nigrum*).

CUSTARD APPLE (*anona*). This is almost the only exotic fruit growing in China.

PUMELO, three varieties—called the "peck-measure pumelo," from its size—the "mulberry pumelo," and the "foreign pumelo."

LUNG-YEN, or LONGAN (*Dimocarpus longen*).

WHAMPE (*Cookia punctata*).

PERSIMMON (*Diospyros kaki*).

COOLIE ORANGE (*citrus aurantium*).

WATER-MELON.

MUSK-MELON, a small yellow and fragrant sort.

A native fruit called *Ngan-neen*. I do not know its botanical name.

Respectfully yours,
S. WELLS WILLIAMS.

Col. J. Tutley, of Clarke Co., Va., has transmitted to this office samples of choice wheat grown by him; comprising the Etrurian, Zimmerman, and blue-stem varieties. These wheats have been much sought after, and were distributed in small parcels in different sections of the country. Col. T. has been very successful in their cultivation.

Dr. James Higgins, State Agricultural Chemist of Maryland, has forwarded to this office a copy of his first Annual Report, a valuable document, which reflects much credit on Dr. H., as well as on the enlightened policy of the State, in employing a skillful, professional chemist to devote his whole time and talents to the advancement of agriculture, by means of lectures, agricultural surveys, analyses of soils, &c.

There have also been received

The "Report of the Board of Agriculture of the State of Ohio," from M. B. Batcham, Esq., Secretary of the Board.

"Transactions of the Agricultural Societies in the State of Massachusetts," from W. B. Calhoun, Esq., Secretary of the Commonwealth.

"Report of the Rhode Island Society for the Encouragement of Domestic Industry," from E. R. Potter, Esq., of Providence, R. I.

The above reports contain much valuable information to farmers of the different sections of the country; and will be read with interest wherever they are circulated.

The Office is also indebted to C. F. Hagedoon, Esq., Bavarian Consul at Philadelphia, for a valuable collection of vegetable and other seeds from Bavaria, comprising many varieties before unknown, or but little cultivated in this country.

To B. P. Johnson, Esq., Secretary of the New York State Agricultural Society, for Transactions of that Society for the years 1848 and '49, and also for samples of choice wheat, oats, and barley for distribution.

GEORGIA BURR MILL-STONES.

The fact is worthy of notice, that a siliceous rock, identical in geological position and lithological character with the French burr, abounds in inexhaustible beds in the State of Georgia. From this rock large quantities of millstones are manufactured by a company in Savannah, equal in every respect to the best imported burrs. Specimens of Georgia burr-stone may be seen in the Agricultural Room of the Patent Office.

BICKÈS'S CHEMICAL AZOTIC POWDER.

We have received, through the politeness of William H. Robertson, Esq. (whose letter is given below), a package containing specimens of a newly discovered preparation which has caused considerable sensation in France, called "Bickès's Chemical Azotic Powder." Mr. R. writes as follows:

New York, *May* 10, 1850.

Hon. Thos. Ewbank.

Sir:—I have this day taken the liberty to send you a package which I brought with me from Paris, containing "Bickès's Process of Cultivation without Manure."

The sensation created by this process has been extraordinary under my own eye; and from what I have witnessed, I have been induced to procure from him (M. Bickès) the accompanying preparation, that if it has merit, our country may benefit by it. Your Office being the proper channel for its distribution, I send it to you for that purpose, recommending that it should be tried upon poor and exhausted land.

I have myself seen the largest stalks of wheat, the largest stems, shoots, and heads I ever saw, said to have been grown in moveable sand. With the package is the mode of application.

I am, with great respect, your ob't servant,

WILLIAM H. ROBERTSON.

From a cursory glance through the pamphlet accompanying the preparation forwarded by Mr. R., it would appear that the inventor, M. Bickès,

after a long and careful study of vegetable physiology, became convinced that the growth of plants is mainly dependent upon the organs of absorption and assimilation, and that these being located in that portion of the plant above the ground, the great desideratum was to discover some cheap, chemical compound, which would stimulate their development.

This compound he thinks he has discovered in the form of what he calls an *azotic powder*.

The advantages which he claims for his new system are as follow:

1st. A general adaptation to all soils and plants, whether the last be of field or garden culture.

2d. A superior yield to the ordinary process, with half the seed.

3d. Greater economy—the cost of the manure being only $2.00 per acre.

4th. Vegetation being so rapid as to enable the farmer, with certain plants, to make two crops in a season where before he grew but one.

5th. Increased size of fruit.

6th. Flavor of fruit improved, and perfume of flowers increased.

7th. Remedy for disease in plants.

8th. Fallow dispensed with.

9th. Immediate profitable yield from the most sterile land.

The mode of application is to add to the powder sufficient warm water to form a paste; and then to mix the seed thoroughly with this before sowing.

These specimens have been submitted to persons eminently capable of testing their merits; and the results of their experiments will hereafter be given to the public.

SAMPLES OF BEAUTIFUL COTTON.

MEMPHIS, *November 20th*, 1849.

I forward you four samples of the most popular varieties of cotton in our section of country, with labels annexed of the names of the planters by whom they are cultivated; being specimens of the kinds alluded to in the communication addressed to you, a few days since, by Dr. Samuel Bond and myself.

We would be pleased, if you would submit the samples to the inspection of a good manufacturing gentleman, who may happen to visit your city from the North, for an expression of his opinion of the *staple* of the different samples, and learn if any specific objection is expressed to the staple of the mastodon sample. I would particularly suggest, that the *scrutiny* should be made by gentlemen *practically* informed in the manufacture of cotton fabrics.

Yours, very respectfully,

JOHN P. POPE.

HON. THOMAS EWBANK,
Commissioner of Patents.

(The samples of cotton received with the above note, have been shown to a number of gentlemen qualified to judge of the merits of this important staple, who expressed very favorable opinions. Nor have we heard any criticism worth repeating. The cotton is naturally excellent, and it has been handled in the best manner. Vast sums of money are annually lost by negligence in gathering, ginning, packing, and transporting cotton to distant markets.)

The high value which farmers in all parts of the country set upon the Reports issued from the Patent Office, will be seen from the following extract from a letter of Mr. J. P. Rounseville, of Allegheny. Co., N. Y.

"Through the kindness of Hon. David Rumsey, M. C., I received the Patent Office Report for 1847, and read it with the greatest pleasure. I inquired at the bookstores in this county for the Report of previous years, and only found that of 1845.

"A few days since, Mr. R. sent me the Report for 1848, so that now I have three, '45, '47 and '48. I can scarcely estimate the value of these three books to me and my neighbors in farming. They were the first books on farming that I had ever read; for I did not think I needed any *book knowledge* on this subject.

"I have since obtained the State Agricultural Transactions for 1847–48. After reading what other farmers have done, and what improvements have been made, I see the defects in our system in practice here; and, anxious to obtain further information, so that we may be able to remedy them, my neighbors are as desirous as myself to read and profit by these books; and I think it the duty of those who are so fortunate as to receive them, to lend them to such farmers as will be benefited by reading them.

"The value of the agricultural products of this county is about $200,000 yearly; and I estimate that 2 per cent. has been added to this amount in 1849, and 3 per cent. will be added in 1850, amounting to from $4000 to $6000 a year; from the information derived from the 40 or 50 copies of the Patent Office Report distributed among our farmers.

"I have looked the subject over carefully, and I do not think my estimate too high. This benefit, too, is not a mere transient one, like a load of manure on land, that will soon wear out, but perpetual. If there is any thing which I can do here, or any information which I can send, that will increase the usefulness of your office, and in part repay the benefits I have derived from your Reports, I shall esteem it a privilege to do it."

VII.

ANALYTICAL TABLES.

PROXIMATE ORGANIC ANALYSIS OF FIVE VARIETIES OF RIPE MAIZE OR INDIAN CORN.

(BY J. H. SALISBURY, M. D., ALBANY, N. Y.)

Proportions.

1. Golden Sioux corn, 100.00 grs. gave:

Water	15.02
Dry	84.98

2. Large 8-rowed yellow corn, 100 grs. gave:

Water	14.00
Dry	86.00

3. Small 8-rowed yellow corn, 100 grs. gave:

Water	14.03
Dry	85.97

4. White flint corn, 100 grs. gave:

Water	14.00
Dry	86.00

5. Ohio dent corn, 100 grs. gave:

Water	14.50
Dry	85.50

1. Proximate analysis of the Golden Sioux corn. A bright yellow 12-rowed variety, passing into 14 rows; frequently 14 rows at the base of the ear. It may perhaps be regarded as an improved variety of Buel's Dutton corn, as it ripens earlier, and I believe has a smaller kernel:

Starch	36.06
Gluten	5.00
Oil	3.44
Albumen	4.42
Casein	1.92
Dextrine	1.30
Fibre	18.50
Sugar and extractive matter	7.25
Water	15.02
	100.05

2. Organic analysis of the Ohio dent corn, one of the largest varieties of maize:

Starch	41.85
Gluten	4.62
Oil	3.88
Albumen	2.64
Casein	1.32
Dextrine	5.40
Fibre	21.36
Sugar and extract	10.00
Water	10.00
	101.07

3. Organic analysis of the small 8-rowed corn:

Starch	30.290
Gluten	5.600
Oil	3.900
Albumen	6.000
Casein	2.200
Dextrine	4.615
Fibre	26.800
Sugar and extract	5.200
Water	13.400
	98.005

4. Analysis of white flint corn. Grown upon a clay loam, and manured in the hill, with a mixture of coal, ashes, and horse-dung, and ashed with unleached ashes twice:

Starch	40.34
Gluten	7.69
Oil	4.68
Albumen	3.40
Casein	0.50
Dextrine	2.90
Sugar and extractive matter	8.30
Water	14.00
Fibre	18.01
	99.72

The water has been determined from the ground grain, and some oil has been found upon the paper enveloping its contents: probably the water may be stated too high by 1 per cent.

5. Organic analysis of the larger variety of 8-rowed yellow corn:

Starch	49.22
Gluten	5.40
Albumen	3.32
Oil	3.71
Casein	0.75
Fibre	11.96
Dextrine	1.89
Sugar and extract	9.55
Water	14.00
	99.80

The amount of starch in this variety was unexpected, and a small part may be set down as adherent albumen.

Additional Analysis of White Flint Corn.

1. Analysis of the kernels of white flint corn, cut August 22d. Sown upon the same soil as the small 8-rowed yellow, a sandy loam, and manured in part with coal ashes:

Silica	9.500
Alkaline and earthy phosphates	35.500
Lime	0.160
Magnesia	2.410
Potash	23.920
Soda	22.590
Chlorine	0.405
Sulphuric acid	4.385
Organic matter	0.367
	99.237

2. Analysis of the leaves of the white flint corn, cut August 22d:

Silica	53.550
Earthy phosphates	19.250
Lime	6.092
Magnesia	1.250
Potash	12.762
Soda	8.512
Chlorine	9.762
Sulphuric acid	4.185
	101.371

3. Analysis of the cob of white flint:

Silica	13.600
Earthy phosphates	23.924
Lime	0.300
Magnesia	0.900
Potash	35.802
Soda	5.914
Chlorine	0.132
Sulphuric acid	0.345
Organic matter	2.314
Carbonic acid	6.134
	89.365

In each of the foregoing results, the quantity of silica is greater than in the 8-rowed yellow corn growing beside it and treated in the same way. The ash, in its physical properties, appeared more siliceous than it usually is, and hence I have no doubt the analyses are correct. It goes to show that the same plant may take up and assimilate a greater amount of inorganic matter under some circumstances than in others. This corn, besides being supplied with manure of the horse, mixed with coal ashes in the hill, was ashed with unleached ashes. The consequence was that the crop gave a remarkably sound, hard grain. It would seem that this treatment had some share in producing the excess of silica obtained in the foregoing analyses.

Analyses of the Parts belonging to Broom-Corn.

1. Analysis of the stalks:

		Removed from the soil in a ton of Stalks.
Silex	6.24	1.828 lbs.
Earthy phosphates	16.66	4.881
Lime	6.25	1.831
Magnesia	3.74	1.095
Potash	30.40	8.907
Soda	15.46	4.529
Sulphuric acid	9.07	2.657
Chlorine	2.14	0.627
Peroxide of iron	2.61	0.764
Organic matter and magnesia	6.24	1.828
	98.81	28.947

2. Analysis of the sheaths of the broom-corn:

		Removed in a ton.
Silica	40.20	28.903 lbs.
Earthy phosphates	15.00	10.785
Lime	3.00	2.157
Magnesia	3.24	2.329
Potash	26.56	19.096
Soda	7.33	5.270
Sulphuric acid	3.57	2.566
Chlorine	1.72	1.236
	100.62	72.342

3. Analysis of the ripe broom-corn brush, with the seeds:

		Removed from the soil in a ton of Brush and Seeds.
Silex	32.50	11.960 lbs.
Earthy phosphates	36.15	13.303
Lime	0.40	0.147
Magnesia	0.10	0.036
Potash	27.32	10.053
Soda	2.37	0.870
Chlorine	2.50	0.846
Sulphuric acid	undetermined	
	101.14	37.215

4. Composition of the ash of broom-corn seed:

Carbonic acid	not determined
Silicic acid	41.975
Sulphuric acid	not determined
Phosphoric acid	28.760
Phosphate of peroxide of iron	0.525
Lime	0.845
Magnesia	3.010
Potash	3.920
Soda	7.247
Chlorine	0.245
Organic acids	4.200
	90.727

Proportions.

Water	12.22
Dry matter	87.78
Ash	3.00
Per centage of ash calculated on the dry matter	3.417

Analysis of Buckwheat.

In its classification as a plant, buckwheat belongs to a family far removed from the cereals; but in the composition and properties of its seed, it approximates to them closely, and hence it is placed here. A few analyses only have been made of it. The two following will show the composition of the ash of the seed. They also show, in the amount of earthy phosphates and phosphoric acid, a remarkable similarity to the grains of the cereals. Its specific gravity is 1.081.

Silica	7.06
Earthy phosphates	57.60
Lime	0.14
Magnesia	2.66
Potash	23.33
Soda	2.04
Sulphuric acid	7.30
Chlorine	0.20
	100.23

The amount of silica may have been increased from want of attention to the foreign matter upon the seed; its well known grittiness, when not removed by a mill, renders the supposition probable.

Composition of the Ash of Buckwheat.

		Removed in every 10 bushels of seed.
Carbonic acid	trace	
Silicic acid	1.95	0.245
Sulphuric acid	1.55	0.195
Phosphoric acid	49.85	6.281
Lime	3.01	0.379
Magnesia	15.84	1.995
Potash	21.27	2.680
Soda	2.32	0.292
Chlorine	0.30	0.037
Organic acids	2.75	0.346
	98.84	12.450

Proportions.

Water	12.875
Dry matter	87.125
Ash	3.600
Ash calculated on the dry matter	4.132

Proximate organic Analysis of Buckwheat.

Starch	42.47
Sugar and extractive matter	6.16
Dextrine or gum	1.60
Epidermis	14.42
A light gray matter taken up by a weak solution of caustic potash from the bodies insoluble in water and boiling alcohol	10.10
Albumen	6.70
Casein	0.78
Matter dissolved out of the bodies insoluble in water, by boiling alcohol; rising with a substance analogous to water	2.66
Oil	0.47
Water	12.88
	98.24

Analysis of Fruit Trees.

(BY PROF. EMMONS, ALBANY, N. Y.)

Pear Tree.

	Sap Wood.	Heart Wood.	Bark of the Trunk.
Water	48.80	22.05	63.70
Dry	37.20	77.95	30.30
Ash	0.20	0.10	1.99

Root of the Pear Tree.

	Wood.	Bark.
Water	22.33	58.80
Dry	79.67	46.20
Ash	0.40	3.26

The wood of the pear gives 9.79 per centum of charcoal. The wood of the pear is soft, close-grained, and easily wrought, and hence is sometimes substituted for box in large wood engravings.

Sweet Apple Tree.

	Sap Wood.	Heart Wood.	Bark of the Trunk.
Water	39.10	33.35	59.00
Dry	60.90	66.65	41.00
Ash	0.35	0.16	4.55

Sugar Maple.—(*Acer saccharinum.*)

Tree sound. Diameter three feet from the ground, 28 inches; do. 12 feet from the ground, 21½ inches. From the base to the limbs, 62 feet. Whole length of the tree, 107 feet. Average thickness of the bark, ¾ inch. Age, 224 years. At twelve feet from the base, the 100 outside layers were taken for outside wood, making a thickness of 4⅝ inches; the remaining layers were taken for inside wood. Growth very uniform. Average thickness of each layer, 0.04464 of an inch.

	Bark.	Outside Wood.	Heart Wood.
Potash	0.88	8.77	4.21
Soda	7.75	0.964	
Chloride of sodium	0.08	......	0.08
Sulphuric acid	1.497	1.171	1.08
Carbonic acid	37.12	37.247	33.38
Lime	49.33	31.86	43.14
Magnesia	3.64	8.40	7.24
Phosphate of peroxide of iron	0.32	0.70	1.34
Phosphate of lime	3.13	5.70	5.09
Phosphate of magnesia	0.02	1.80	0.22
Organic matter	1.50	2.40	1.93
Insoluble silica	0.15	0.50	0.55
	105.417	100.512	98.16

Hickory.—(*Carya alba.*)

The wood has been seasoned during one summer and fall, and grew in the valley of the Mohawk.

	Outside Sap Wood.	Inside Sap Wood.	Heart Wood.	Bark.
Potash	7.472	20.187	12.210	2.340
Soda	0.084	0.085	0.055	0.125
Chlorine	0.096	0.085	0.065	0.145
Sulphuric acid	0.892	4.640	5.260	1.925
Phosphate of peroxide of iron, Phosphate of lime, Phosphate of magnesia	14.440	11.450	6.340	5.000
Carbonic acid	29.576	21.405	33.630	33.995
Lime	38.264	27.695	43.520	51.105
Magnesia	6.200	8.600	4.000	0.820
Silica	4.200	6.150	1.300	4.550
Soluble silica	0.280	0.610	trace	0.250
Organic matter	undeter	mined.		
	101.504	100.331	106.390	100.255

White Oak.—(*Quercus alba.*)

Ash obtained from the Green Wood.

	Sap Wood.	Heart Wood.	Wood of Twigs.	Bark of Trunk.	Bark of Twigs.
Potash	13.41	9.68	9.74	0.25	1.27
Soda	0.52	5.03	6.89	2.57	4.05
Sodium	2.78	0.39	0.16	0.03	0.08
Chlorine	4.24	0.47	0.25	0.12	0.13
Sulphuric acid	0.12	0.26	0.08	0.03	trace
Phosphate of peroxide of iron, Phosphate of lime, Phosphate of magnesia	32.25	13.30	23.60	10.10	14.15
Carbonic acid	8.95	19.29	17.55	29.80	30.33
Lime	30.85	43.21	34.10	54.89	47.72
Magnesia	0.36	0.25	0.50	0.20	0.20
Silica	0.21	0.88	0.55	0.25	0.65
Soluble silica	0.80	0.30	0.60	0.25	0.65
Organic matter	5.70	7.10	5.90	1.16	1.52
	100.18	100.06	99.99	100.05	100.00

The oak grew in the immediate neighborhood of Albany, upon a stiff clay, known as the Albany clay.

SWAMP WHITE OAK.—(*Quercus bicolor.*)

	Bark.	Outside Wood.	Inside Wood.
Potash	0.459	20.49	14.79
Soda	trace	3.15	3.69
Chloride of sodium			
Sulphuric acid	0.295		
Carbonic acid	40.335	32.919	34.61
Lime	52.26	30.23	35.87
Magnesia	0.25	0.50	0.51
Phosphates	3.50	5.20	6.30
Organic matter	2.13	....	2.70
Silica	2.00	1.50	0.50
Coal	2.50	4.00	1.60
Moisture	....	....	2.60
	103.729	97.909	103.17

WHITE ELM.—(*Ulmus Americana.*)

Tree sound. Diameter three feet from the base, 28 inches; ditto fourteen feet from the base, 25½ inches. Mean thickness of the bark, ¾ inch. Whole length of the tree, 111 feet. Number of layers fourteen feet from the base, 208. Average thickness of each layer, 0.05769 of an inch. Thickness of layers quite uniform. From 80 to 85 outside layers taken for outside wood, the remaining layers for inside wood.

	Bark of Trunk.	Outside Wood.	Bark of Twigs.	Wood of Twigs.
Potash	3.79	....	5.82	9.61
Soda	1.65	....	6.53	18.41
Chloride of sodium	trace	....	0.07	
Sulphuric acid	0.14	12.02	2.80	3.98
Carbonic acid	39.44	....	24.72	26.07
Lime	27.46	....	16.92	14.77
Magnesia	13.10	....	3.00	2.40
Phosphate of peroxide of iron, Phosphate of lime, Phosphate of magnesia	3.40	....	24.50	22.35
Organic matter	2.00	....	1.50	
Insoluble silica	1.75	....	....	0.50
Coal	....	....	....	0.30
Moisture	3.10			
	85.86	12.02	95.82	97.49

CHESTNUT.—(*Castanea vesca.*)

	Bark.	Outside Wood.	Inside Wood.
Potash	1.36	4.56	2.73
Soda	0.319	1.41	1.98
Chloride of sodium	trace		
Sulphuric acid	0.312	0.50	
Carbonic acid	39.90	23.842	29.52
Lime	51.60	40.76	38.20
Magnesia	0.60	5.77	0.513
Phosphate of peroxide of iron	0.20	1.30	0.30
Phosphate of lime	2.90	17.44	8.60
Phosphate of magnesia			
Organic matter	5.00	1.74	3.20
Silica	1.20	1.43	1.71
Coal	1.00	0.914	1.76
Moisture	3.00	......	2.13
	107.391	99.666	90.143

Red Beech.—(*Fagus ferruginea.*)

Tree a little hollow at the base. Diameter three feet from the ground, 28 inches; fourteen feet from the ground, 22 inches—sound. Average thickness of the bark, $\frac{1}{4}$ inch. Section for analysis taken fourteen feet from the ground. Age, 240 years. Growth, quite uniform. Average thickness of each layer, 0.0453 of an inch. Between 60 and 65 outside layers taken for outside wood; the remaining layers for inside wood.

	Bark.	Outside Wood.	Heart Wood.	Bark of Twigs.	Wood of Twigs.
Potash	0.13	12.13	4.04	0.63	11.00
Soda	....	15.58	25.53	4.63	11.79
Chloride of sodium	....	0.05	0.24	0.14	0.16
Sulphuric acid	....	0.47	0.62	4.54	14.68
Carbonic acid	40.41	24.39	24.59	18.18	1.79
Lime	52.29	31.56	31.82	23.52	2.31
Magnesia	0.32	5.44	1.44	3.41	6.08
Phosphate of lime	....	17.23	22.04	18.89	35.60
Phosphate of peroxide of iron	1.36	0.85	0.40	0.41	0.80
Phosphate of magnesia	....	0.93	0.02	0.10	10.89
Organic matter	....	1.86	2.80	3.01	10.50
Insoluble silica	3.30	1.45	1.60	29.00	0.92
Coal	1.50	....	....	....	0.31
	99.91	111.99	115.14	106.46	106.83

Bass Wood.—(*Tilia Americana.*)

Tree sound. Mean diameter four feet from the ground, 22 inches. Average thickness of the bark, 1 inch. Age, 182 years. About 60 of the outside layers were taken for outside wood. Thickness, $4\frac{1}{2}$ inches. The remaining layers taken for inside wood. Growth uniform. Average thickness of each layer, 0.0549 of an inch.

	Bark.	Outside Bark.	Heart Wood.	Bark of Twigs.	Wood of Twigs.
Potash	1.26	10.12	4.05	1.90	14.55
Soda	12.77	2.88	10.41	9.14	
Chloride of sodium	0.24	0.50	0.52	0.15	0.10
Sulphuric acid	0.72	0.83	0.27	4.19	13.34
Carbonic acid	25.38	16.64	17.96	22.84	3.94
Lime	41.92	38.36	45.24	29.56	11.56
Magnesia	2.24	7.36	7.44	3.00	7.44
Phosphate of peroxide of iron	0.20	1.20	1.80	0.31	0.60
Phosphate of lime	8.50	17.95	8.96	24.77	38.92
Phosphate of magnesia	0.30	2.60	0.04	0.72	1.28
Organic matter	1.70	2.58	2.00	2.40	9.61
Insoluble silica	4.60	2.10	1.40	0.40	0.10
Coal	....	....	0.80		
	99.83	103.12	99.59	100.18	101.44

Butternut.—(*Juglans cinerea.*)

Tree sound. Diameter three feet from the ground, 2 feet 8 inches; eleven feet from the ground, 1 foot 8 inches. The section for analysis was taken eleven feet from the ground. Average thickness of the bark, $\frac{3}{4}$ inch. Age, 146 years. Between 65 and 70 outside layers were taken for outside wood; thickness, $4\frac{1}{2}$ inches; the remaining inside layers taken for inside wood. Growth of tree more rapid when young.

	Bark.	Outside Wood.	Heart Wood.	Bark of Twigs.	Wood of Twigs.
Potash	1.00	4.42	1.00	0.63	3.28
Soda	11.27	5.61	14.82	11.24	14.59
Chloride of sodium	0.15	0.16	0.13	0.03	0.03
Sulphuric acid	0.74	13.33	21.43	5.33	5.36
Carbonic acid	32.12	20.02	4.48	18.92	7.02
Lime	37.68	38.98	42.02	24.48	9.08
Magnesia	10.08	3.52	4.00	2.22	5.34
Phosphate of peroxide of iron	0.30	3.40	3.41	0.41	0.50
Phosphate of lime	2.25	2.20	0.59	29.25	40.39
Phosphate of magnesia	0.15	0.06	0.28	1.04	1.61
Organic matter	2.80	3.40	3.20	4.41	5.20
Insoluble silica	0.30	4.80	5.40	0.40	0.32
Coal	....	....	....	0.80	1.21
Water	....	....	....	....	3.41
	98.84	100.20	100.76	99.16	97.34

Iron Wood.—(*Ostrya Virginica.*)

	Sap Wood.	Heart Wood.	Wood of Twigs.	Bark of Trunk.	Bark of Twigs.
Potash	1.581	14.549	20.76	0.696	2.78
Soda	0.025	0.086	2.97	0.023	0.405
Chlorine	0.049	0.098	0.25	0.04	0.15
Sulphuric acid	0.086	0.378	0.64	0.086	0.52
Phosphate of peroxide of iron, Phosphate of lime, Phosphate of magnesia	5.65	23.10	35.4	5.10	10.55
Carbonic acid	36.159	20.139	12.22	33.853	33.975
Lime	48.791	27.461	20.98	57.932	48.225
Magnesia	4.20	4.40	5.6	1.20	1.00
Silica	0.20	0.40	0.4	0.25	2.30
Soluble silica	....	....	....	0.276	
Organic matter	2.853	undetermined			
	99.577	90.611	99.21	99.456	99.905

FRUIT TREES.

Peach.—(*Amygdala Persica.*)

Small seedling peach. Age of the tree, 23 years. Mean diameter, 3½ inches. Thickness of bark, $\frac{1}{7}$ inch. Growth, rather slow. Average thickness of each layer, 0.0699 of an inch.

	Bark of Trunk.	Wood of Trunk.	Bark of Root.	Wood of Root.	Leaves.	Pits.*	Bark of Limbs.†	Wood of Limbs.†
Potash, Soda	1.20	7.11	3.162	8.58	12.41	18.47	8.85	19.21
		11.15	1.92	15.92	.....	5.21	......	8.11
Chloride of sodium	0.04	0.16	0.33	5.60	.....	2.70	0.28	0.24
Chloride of potassium	.....	.....	....	.....	0.36			
Sulphuric acid	4.19	1.51	3.44	0.58	12.12	15.12	6.18	8.07
Carbonic acid								
Lime	42.17	23.26	38.48	0.11	14.77	16.80	31.98	24.64
Magnesia	2.16	6.40	2.91	0.01	8.00	1.33	6.00	9.76
Phosphate perox. iron, Phosphate lime	0.45	0.32	10.40	1.02	2.47	1.33	1.60	0.60
	18.79	29.19		18.10	10.44	17.98	8.50	13.20
Phosphate magnesia	0.01	1.34	......	30.00	3.15	0.02	0.20	0.20
Organic matter	3.30	5.20	3.60	2.55	0.86	6.61	5.00	8.40
Insoluble silica	4.15	1.35	9.40	6 46	6.42	10.00	4.30	1.00
Coal	.....	.....	1.40	.....	4.48	.....	1.00	1.20
	109.04	104.97	104.562	89.02	86.85	128.77	99.03	104.99

* Analysis made with two grains of ash. † Peach limbs half an inch in diameter.

Leaves of the peach tree, July 22:

Carbonic acid	13.300
Silicic acid	0.600
Phosphates	9.600
Lime	16.220
Magnesia	5.900
Potash	14.280
Soda	21.220
Chlorine	5.120
Sulphuric acid	4.420
Organic acids	7.900
	98.560

Leaves affected with *the yellows:*

Carbonic acid	13.200
Silicic acid	0.800
Sulphuric acid	4.430
Phosphates	11.600
Lime	14.300
Magnesia	5.300
Potash	14.440
Soda	22.280
Chlorine	4.740
Organic acids	4.300
	99.390

PLUM.—(*Prunus domestica.*)

Tree cut first of May.

	Proportions.			
	Bark of Root.	Wood of Root.	Bark of Limbs.	Wood of Limbs.
Per centage water	48.51	44.64	27.50	20.23
Per centage dry wood	51.49	55.36	72.50	79.67
Per centage ash	3.12	0.24	4.37	0.38

	Analysis.				
	Plum Pits.*	Bark of Root.	Wood of Root.	Bark of Limbs.	Wood of Limbs.
Potash	13.92	9.86	40.31	8.59	11.63
Soda	10.08	6.63		19.49	
Chloride of sodium	2.25	4.22	0.103	1.03	0.18
Sulphuric acid	6.11	5.22	4.64	4.09	20.34
Carbonic acid					
Lime	23.30	22.74	0.17	39.42	8.12
Magnesia	4.80	0.98	0.20	3.76	6.56
Phosphate of peroxide of iron		6.90	1.20	2.80	0.60
Phosphate of lime	8.00	7.62	31.98	7.50	24.99
Phosphate of magnesia		3.28	17.12	trace	1.16
Organic matter	6.65	1.76	2.50	1.40	4.50
Insoluble silica	27.20	21.40	1.80	8.40	0.70
Coal	......	3.60	0.90	......	1.60
	102.31	94.21	100.923	95.98	80.53

* This analysis was made with two grains of ash.

Apple.—(*Pyrus malus.*)

Sweet apple: age of the tree, 19 years; diameter of section taken for analysis, 6 inches; thickness of the bark, ¼ inch; average thickness of each layer, 0.1447 of an inch.

	Bark.	Outside Wood.	Heart Wood.	Bark of Root.	Wood of Root.
Potash	0.44	3.288	2.75	0.66	15.07
Soda	1.53	3.33	1.62	11.38	21.99
Chloride of sodium	0.30	0.33	0.51	0.10	0.11
Sulphuric acid	38.39	12.21	22.17	30.83	1.84
Carbonic acid	49.56	15.79	38.98		
Lime	1.86	15.56	2.66	1.00	11.64
Magnesia	2.56	3.52	2.93	8.72	0.16
Phosphate of peroxide of iron }				0.72	0.91
Phosphate of lime }	3.60	37.50	24.40	6.39	13.96
Phosphate of magnesia }				......	31.35
Organic matter	3.35	3.20	3.60	1.80	1.20
Insoluble silica	1.26	0.45	0.20	2.86	1.46
Coal	1.26	0.35	0.01	0.72	
	104.21	95.528	99.83	65.18	99.69

Rose Tree.

	Bark.	Wood.
Potash	5.12	11.60
Soda	8.52	5.99
Chloride of sodium	3.20	3.00
Sulphuric acid	5.00	6.00
Carbonic acid	28.79	15.87
Lime	22.56	10.46
Magnesia	2.86	3.80
Phosphate of iron	15.30	31.00
Organic matter	1.60	
Silica	3.30	3.00
Coal	2.40	2.30
Moisture	1.00	0.50
	2.00	1.00

Leaves of the Pear Tree, picked May 23. Flowers just fallen:

Carbonic acid	11.560
Silicic acid	1.750
Phosphates	25.050
Lime	4.715
Magnesia	4.500
Potash	18.950
Soda	15.190
Sulphuric acid, chlorine, and organic acids not determined.	
	81.715

Leaves of the Early Harvest Apple, collected Sept. 30. Bearing fruit:

Silica		5.775
Earthy Phosphates—		
Phosphate of peroxide of iron	4.875	
Phosphate of lime	1.416	
Phosphate of magnesia	trace	
Silica	5.125	
Phosphoric acid	5.359	
		16.775
Lime		36.398
Magnesia		0.075
Potash		13.179
Soda		11.616
Chloride of sodium		0.060
Sulphuric acid		0.137
Carbonic acid		15.200
Organic matter		2.850
		101.065

Proportions.

Water	54.341
Dry	45.659
Ash	4.194
Calculated dry	9.163

Leaves of the Bergamot Pear, collected Sept. 30. Bearing fruit:

Silica		4.250
Earthy phosphates—		
Phosphate of peroxide of iron	4.600	
Phosphate of lime	7.559	
Phosphate of magnesia	0.660	
Silica	0.450	
Phosphoric acid	3.781	
		16.550
Lime		39.853
Magnesia		5.920
Potash		8.793
Soda		
Chlorine		0.554
Sulphuric acid		4.464
Carbonic acid		17.125
Organic matter		3.000
		100.509

Proportions.

Water	56.138
Dry	43.862
Ash	3.260
Calculated dry	7.514

Leaves of the Ox-heart Cherry, picked May 23. Flowers just fallen:

Carbonic acid	11.450
Silicic acid	1.850
Phosphates	26.650
Lime	3.941
Magnesia	3.465
Potash	23.757
Soda	12.365
Sulphuric acid, chlorine, and organic acids not determined.	
	83.478

Leaves of the Large Yellow Spanish Cherry, collected September 30:

Silica	4.225
Phosphates	37.175
Lime	21.957
Magnesia	3.195
Potash	13.948
Soda	1.657
Chloride of sodium	0.410
Sulphuric acid	10.260
Organic matter	7.650
	100.577

Proportions.

Water	58.628
Dry	41.372
Ash	3.434
Calculated dry	8.300

Leaves of the Catawba Grape, collected Sept. 30. Fruit abundant:

Silica		23.150
Earthy phosphates—		
Phosphate of iron	6.750	
Phosphate of lime	11.648	
Phosphate of magnesia	0.150	
Silica	4.050	
Phosphoric acid	6.152	
		28.750
Lime		26.258
Magnesia		5.330
Potash		1.710
Soda		2.983
Chloride of sodium		0.305
Sulphuric acid		1.426
Carbonic acid		8.900
Organic matter		3.450
		102.262

Proportions.

Water	11.169
Dry	28.831
Ash	2.282
Calculated dry	7.915

Leaves of the Catawba Grape, picked June 2, nearly full grown:

Carbonic acid	3.050
Silicic acid	29.650
Sulphuric acid	2.062
Phosphates	32.950
Lime	4.391
Magnesia	1.740
Potash	13.394
Soda	9.698
Chlorine	0.741
Organic acids	2.250
	99.926

FRUIT OF THE BLACK WALNUT.

	Rind.	Shell.	Meat.
Silica	1.35	0.40	1.85
Earthy phosphates	15.60	18.50	40.95
Carbonate of lime	23.75	5.60	0.10
Magnesia	1.55	0.10	trace.
Potash	41.43	47.00	22.99
Soda	7.12	10.21	4.98
Sulphuric acid	2.65	9.84	11.05
Chlorine	1.60	2.15	trace.
Organic matter	1.30	5.40	5.00
Alkaline phosphates			9.10
	96.35	99.20	96.02

CURRANT LEAVES AND FLOWERS.

Two hundred grains of the leaves gave 4.00 grains of ash, and the same weight of the flowers gave 2.95 of ash, but the analysis was not finished. The leaves are particularly rich in soda and the phosphates. The analysis of the flower was undertaken for the purpose of determining the amount of silica, an element which I have found rather abundant in floral organs, particularly the petals. In the ash of the blossom of the currant I have found 9 per centum of silica and 28 per centum of potash, a result which indicates the predominance of potash rather than soda in these organs.

THE BEST TIME FOR CUTTING TIMBER, ETC.

Experience has proved that trees for timber, if cut at one season of the year, are far more durable than if cut at another. Various reasons have been suggested why this is so, and it is not perhaps yet fully determined; still, as the time which experience has pointed out, as the best for durability, is during the autumn, it is generally supposed that this property is modified by the amount of sap in the trunk, and the maturity of the wood itself. In the spring, or at any earlier period of it, the trunk of most trees is pressed with the ascending sap. The leaves as yet are still folden in the bud, and the surfaces for exhalation are only sufficient to carry off very slowly the watery part of the sap. Even after the leaves have expanded, or until mid-summer has arrived, the tree abounds in juices. When, however, the dry and sultry summer has arrived, and the new wood and buds have been matured and formed, the watery part of the sap is mostly exhaled, and probably, too, the circulation is less active as the leaves become sere.

It is stated by Mr. Emerson, author of the valuable report on the trees and shrubs of Massachusetts, that the soft maple cut in September, is three times more lasting than ash or walnut cut in the winter; and, from numerous inquiries which he has made in various quarters, and from information obtained from reliable sources, it seems he has established the fact that autumn is the time for cutting timber. When it is determined to cut timber, it is of considerable importance to strip off the bark in the spring, that the body of the tree may dry during the summer. When, however, it is an object to re-produce a forest from the remaining stumps, then winter, or the very first of spring, is much more favorable to the growth of sprouts.

There are, then, two seasons for cutting wood: if it is expected to last, it must be cut the last of summer, or during the early part of autumn; if it is wished to clothe the surface with a new growth of trees, the cutting must be made late in winter.

It is, however, possible to modify these arrangements: if, for example, the wood is designed for timber, if it is deprived of its bark in the spring, it may be allowed to stand and season till winter arrives, which is a period when farmers have less to do than in the summer or autumn.

In seasoning, wood retains an amount of water which may be regarded as its constitutional supply. This constitutional water is very important; for upon its presence some of the most valuable properties of the wood depend. I refer to elasticity and strength. If wood, for example, is dried in a water bath at 212° till it ceases to lose weight, its elasticity and strength is very much diminished. Hickory, when dried in this way becomes as brittle as pine. In ordinary seasoning, or in steaming, I believe the strength of wood is not diminished. This observation may not be of much practical importance, as this last plan of seasoning is rarely followed. The amount of water varies, as will be observed, in different species of trees, as well as in herbaceous plants.

In another point of view, the amount of water is important to be known, for the difference between taking green and dry wood to market, as well as in consuming, is very great; and so also, as ample experience proves, there is a material difference in burning green and dry wood. The quantity of

water in the wood varies from 20 to 50 per centum, and probably the average amount will not differ from 35 to 40 per centum. This water is not only of no use to the fire-wood, but it is prejudicial, as it must be dissipated by heat, in which act heat or caloric becomes latent and lost, especially if the wood is consumed upon a hearth or in a stove.

In addition to the effect of water in diminishing the combustibility of wood, the alkalies have also considerable influence of this kind. Elm, which is a potash wood, burns with less freedom than hickory, which contains much lime.

It is, however, possible that the size of the pores of wood may modify its combustibility. Black oak is a notable instance of a slow and drizzling combustion; the pores are large and numerous, from which the watery sap continually oozes.

ANALYSIS OF CLOVER.

BY PROF. WAY.

The following tables exhibit the composition of the ash of red and white clover hay. The specimens of clover were dried in the air until they attained the condition of ordinary new-made hay. In this state they still retained a considerable proportion of water, as is seen in the following table:—

Percentage of Water and Ash in four specimens of Clover Hay.

	Red Clover.		White Clover.	
	Silicious Sand.	Clay.	Silicious Sand.	Clay.
Water	13.97	12.20	12.60	12.00
Ash	6.77	7.12	7.70	7.61
Ash calculated on the dry	7.87	8.11	8.81	8.65

Composition of 100 parts of the Ash of Red and White Clover Hay.

	Red Clover.		White Clover.		Mean of Analyses.	
	Silicious Sand.	Clay.	Silicious Sand.	Clay.	Red Clover.	White Clover.
Silica	4.03	2.66	4.63	2.74	3.34	3.68
Phosphoric acid	5.82	6.88	10.93	12.12	6.35	11.53
Sulphuric acid	3.91	4.46	7.05	7.38	4.18	7.21
Carbonic acid	12.92	20.94	18.64	17.41	16.93	18.03
Lime	35.02	35.76	26.32	26.51	35.39	26.41
Magnesia	11.91	10.53	7.46	8.83	11.22	8.15
Peroxide of iron	0.98	0.95	1.17	2.76	0.97	1.96
Potash	18.41	11.30	15.17	13.50	14.85	14.33
Soda	2.79	....	3.98	4.41	1.40	3.72
Chloride of sodium	4.13	0.53	5.56	4.32	2.36	4.94
Chloride of potassium	....	5.92	....	....	2.96	
Total	99.95	99.98	99.94	99.91	99.95	99.96

It is impossible in carefully examining this table, not to observe how very little difference really exists between the specimens of the same variety grown upon different soils; the numbers given for red clover on sand and clay, are, in most respects, singularly alike; and the same of the two columns for the white clover.

It would not be by any means safe to draw very decided conclusions from one or two analyses of this kind; but, so far as an opinion may be formed, the evidence would tend to prove that the *mineral* constitution of clover is but little affected by the character of the soil on which it grows; whilst, on the other hand, the different *varieties* of the plant are found to possess a mineral constitution in some respects essentially distinct.

Mineral Matters contained in a Ton of Red and White Clover Hay.
(*In lbs. and tenths.*)

	Red Clover.	White Clover.
	lbs.	lbs.
Silica	5.2	6.3
Phosphoric acid	10.0	19.9
Sulphuric acid	6.6	12.4
Lime	55.6	45.5
Magnesia	17.7	14.0
Peroxide of iron	1.5	3.4
Potash	23.2	24.7
Soda	2.2	6.4
Chloride of sodium	3.7	8.5
Chloride of potassium	4.7	
	128.4	141.1

ANALYSIS OF THE ASH OF PEAS AND BEANS.

We give below a very important analysis of the ash of peas and beans, and of their straw, by Prof. Way, of the Royal Agr. College, Cirencester, England. This comprises the latest and most authentic researches by this distinguished chemist, and cannot but be interesting to farmers, as showing, in small space, the mineral elements which these crops draw from the soil.

	Peas.	Beans.	Pea straw.	Bean straw.
Silica	1.24	0.88	5.36	3.86
Phosphoric acid	34.81	31.87	4.50	7.35
Sulphuric acid	5.68	4.50	5.66	3.21
Carbonic acid	1.82	1.94	14.74	22.73
Lime	6.32	8.65	37.99	21.29
Magnesia	6.57	6.55	6.73	4 88
Peroxide of iron	0.59	0.36	1.76	0.90
Potash	40.19	42.13	17.17	21.26
Soda	0.65	0.90	2.48	4.56
Chloride of sodium	0.68	1.90	3.57	9.05
Chloride of potassium	1.42	0.34	......	0.90
Total	99.97	100.00	99.96	99.99

ASH OF FLAX SEED.

Professor Way, of the Royal Agricultural College, England, gives the following as the mean of several analyses of the ash of flax or lint seed, recently made by him, and published in the Journal of the Royal Agricultural Society:

Silica	1.45
Phosphoric acid	38.54
Sulphuric acid	1.56
Carbonic acid	0.22
Lime	8.40
Magnesia	13.11
Peroxide of iron	0.50
Potash	34.17
Soda	1.69
Chloride of sodium	0.36
Total	100.00

Seven samples of American Oil-Cake gave the following results:

Oil	11.41
Water	7.60
Nitrogen	4.74
Ash	6.35

From the above figures, the scientific farmer will see, that the manure formed by 100 lbs. of oil cake is more than that derived from 300 lbs. of Indian corn. 300 lbs. of corn contain about 1¼ lbs. phosphoric acid; 100 lbs. oil cake contain about 2½ lbs.

ANALYSIS OF PRAIRIE SOIL.

(We insert with pleasure the following analysis of a specimen of prairie soil, from the farm of Dr. J. A. Kennicott, of The Grove, Ill., made by Prof. James V. Z. Blaney, of Chicago.)

The soil analyzed was taken from a "roll" of the prairie, at or near the summit of the "roll" or elevation. A sod two inches thick was first removed, and the specimen then taken up with a spade—about 6 inches deep; the central portion of which was used for the analysis.

Description.—The soil was a loose, friable loam, of a very intense black color when moist, greyish-black when dry. It contained some small fibres of grass roots, and no gravel. A *mechanical analysis* was first made, as follows: A weighed portion of the soil was treated with distilled water, and agitated for some time; then allowed to settle for one minute; the water

poured off into another vessel, and allowed to stand to deposit the pulverulent matter which it held in suspension. This process was continued until the washings ceased to hold any particles in suspension. The sandy matter left, and the pulverulent matter washed over were each collected on a weighed filter, washed, dried at 212° F., and weighed. The filtrates of both were mixed, evaporated to dryness at 212°, and weighed, giving matter soluble in cold water. A separate portion of the soil, which had been exposed for a long time to a moderately dry air, was dried at 212°, and the hygrometric moisture thus ascertained. These processes gave the following

Results of the Mechanical Analysis.

	Per cent.
Hygrometric moisture	3.50
Sandy particles	66.90
Finely divided do	29.20
Matter soluble in cold water	0.10
	99.70
Loss	0.30
	100.00

A separate analysis was made of the coarser and finer particles. Analysis of the coarser particles gave the following results:

	Per cent.
Organic matter and combined water, together	8.00
Matter insoluble in hydrochloric acid—say, silica	84.00
Combined silica (probably in combination with alkalies)	0.50
Alumina	2.50
Sesquioxide of iron	3.00
Carbonate of lime	1.00
Magnesia and alkalies together	2.00
	101.00

Analysis of the finely divided particles gave

	Per cent.
Organic matter and combined water	10.00
Matter insoluble in hydrochloric acid—say, silica	76.00
Combined silica, (a trace)	
Alumina	4.25
Sesquioxide of iron	4.25
Carbonate of lime	1.50
Magnesia and alkalies, together	2.50
	98.50

The error in the former analysis is, I think, in a measure, due to the fact, that the iron exists in the sandy matter as a protoxide, probably in combination with silica; hence, when calculated as a sesquioxide, it gives too much by about 0.40 per cent.

In the latter analysis, I presume that the iron exists in the form of a protocarbonate. If such be the case, nearly two per cent. should be added, to obtain a correct result.

The analysis of the soil as a whole, as calculated from the above, would give the following as a very close approximation to the truth:

Hygrometric water	3.500
Organic matter and combined water	8.166
Silicious matter insoluble in hydrochloric acid	77.286
Silica combined	0.328
Alumina	2.880
Sesquioxide of iron	3.458
Carbonate of lime	1.094
Matter soluble in cold water, (not examined)	1.000
Magnesia and alkalies, (not separated)	2.369
	100.081

Had a little more time been allowed to me, I would have ascertained with accuracy the amount of alkalies, and also in what state of combination they exist, as carbonates, sulphates, or silicates. I would also have critically examined the organic matter, and tested for the presence of phosphates. I have ascertained that nitrogen is present in the organic matter, as ammonia is evolved at a high temperature.

For the absorbent power of the soil, I find that a specimen, which had been exposed for some time to dry air, when exposed 48 hours over water at 60° F., gains 3 per cent. of water by capillary absorption. Another portion, of the same degree of dryness, exposed *in vacuo* over sulphuric acid at 60° F., lost, in 48 hours, 3.20 per cent. of water, by evaporation into a perfectly dry atmosphere.

The difference in the amount of water retained by capillary attraction, in an atmosphere saturated at 60° F., and that in perfectly dry air at the same temperature, may be stated at 6.20 per cent.

Respectfully yours,

JAMES V. Z. BLANEY.

Hon. Thos. Ewbank, *Washington*.

Chicago, *April 3d*, 1850.

VIII.

STATISTICAL TABLES.

TOBACCO TRADE.

Baltimore, *February* 26, 1850.

Sir:—In complying with your request to furnish a statement of the tobacco trade, we have been enabled to obtain some statistics that will no doubt be interesting.

It affords us pleasure to state that the markets no longer labor under the depression that has existed for four years past; the growth for the last two years has been much less than the consumption, and the surplus occasioned by the heretofore excessive production finds purchasers at increased prices, and at this time our markets are almost bare of stocks. The amount of tobacco consumed is so limited that the trade will not admit of an excessive growth. In the two most thickly-populated countries of Europe—France and England—not more than a certain quantity finds its way there; in France the trade is monopolized by government, which gives out contracts to deliver a stipulated quantity at certain prices; in England the duty imposed is so enormous that only a limited quantity of certain descriptions can be shipped, without the risk of loss. In Germany and Holland, where the trade is more extensively carried on than elsewhere, the duty imposed is almost nominal, and all classes of their citizens are enabled to use the weed, at prices very little higher than its first cost. The tobacco trade constitutes so large a staple of our country, that it is singular greater efforts are not made upon the part of our government to cause a reciprocal duty to be imposed, that more favor may be shown by European governments to this particular article. England, from the duty imposed upon it alone, derives a revenue of $18,000,000, being about $800 the hogshead, or from 10 to 16 times its original cost. France makes the trade a monopoly, from which she derives an income of about $15,000,000.

		Hogsheads.
Stock of tobacco in Baltimore, 1st January, 1849...	32,690	
Inspected during 1849..	45,876	= 78,566
Exported and consumed during 1849..............................		58,938
On hand 1st January, 1850..		19,628

Stock of tobacco, "Western," in New Orleans, Feb. 13, '50... 6,188

The aggregate stock in the two markets show 25,816 hhds., and yet the number of hhds. for sale in factors' hands will not reach 1000—the rest being held by shippers and speculators.

The prices of tobacco must rule high this year, which we fear will be an inducement to planters to make heavy crops, which would undoubtedly tend again to overstock the markets and depress prices. The estimated crops of 1849 are as follows: Maryland, 25,000 hhds.; Virginia, 45,000 hhds.; Ohio, 12,000 hhds.; Kentucky, 60,000 hhds.

Statement of the Tobacco Business in Holland, during 1849.

		MARYLAND.			VIRGINIA.				KENTUCKY.				STEMS.		
	Stock 1st Jan. 1849.	Imports.	Sales.	Stock last Dec., 1849.	Stock 1st Jan. 1849.	Imports.	Sales.	Stock last December.	Stock 1st January.	Imports.	Sales.	Stock last December.	Stock 1st. Jan.	Imports.	Sales.	Stock last December.
Rotterdam	1966	10,831	9,814	2983	2029	1101	2980	150	731	41	762	10				
Amsterdam	5740	9,804	10,269	5275	1001	251	977	275	1073	none	467	606				

Statement of Imports, Sales, and Stocks of Tobacco and Stems, in Bremen, from 1840 *to* 1850.

	MARYLAND.				VIRGINIA.				KENTUCKY.				STEMS.			
In the Year.	Stock 1st January.	Imports.	Sales.	Stock last December.	Stock 1st January.	Imports.	Sales.	Stock last December.	Stock 1st January.	Imports.	Sales.	Stock last December.	Stock 1st January.	Imports.	Sales.	Stock last December.
1840	4,890	14,570	18,399	1,061	245	3492	3422	285	181	3,803	3,699	285	2853	3362	4564	1651
1841	1,061	19,629	18,321	2,369	285	3466	3025	726	285	5,206	4,941	550	1651	7085	7054	1682
1842	2,369	20,821	19,067	4,123	726	6729	5898	1557	550	9,407	8,939	1018	1682	4151	5386	447
1843	4,123	18,483	15,004	7,602	1557	5541	4242	2856	1018	7,485	6,441	2062	447	3969	3447	969
1844	7,602	16,978	18,338	6,242	2856	5092	4282	3666	2062	9,736	9,569	2229	969	4753	5513	209
1845	6,242	24,251	24,571	5,922	3666	1588	3099	2155	2269	11,439	10,328	3340	209	5273	4152	1330
1846	5,922	26,785	23,788	8,919	2155	2386	2456	2085	3340	5,028	6,099	2269	1330	6092	4716	2706
1847	8,919	21,743	20,681	9,981	2085	911	2079	917	2269	3,816	5,013	1072	2706	6788	8038	1456
1848	9,981	12,084	9,935	12,130	917	847	1054	710	1072	4,448	4,980	540	1456	4912	4473	1895
1849	12,130	19,285	22,112	9,303	710	1173	1734	149	540	4,620	4,746	414	1895	4188	5083	1000

RICHARD H. HALL & SON.

HOGS PACKED IN THE WEST—1849–50.

LAFAYETTE, INDIANA, *February* 29, 1850.

SIR:—Having been engaged in the packing and purchasing of pork in the Western States for the last nine years, and frequently seeing publications as to the number of hogs packed, which in many instances get embodied in your Reports, which I have known to be very erroneous, I have taken the liberty to send you statistics which I believe to be correct. I have been to some considerable pains to ascertain accurately, and in most cases by personal inquiry, (having visited recently the principal packing points in the States of Indiana, Illinois, and on the Mississippi river,) the number of hogs packed in the Western States for the season of 1849–50.

It will be remembered by many that a statement originating from me, was published in the N. Y. Tribune, March 7th, 1849, giving the number of hogs packed at some of the principal packing points, amounting to over 1,400,000, without including a large number of smaller places, which I soon after obtained, increasing the number to 1,977,500.

Subsequently, on receiving circulars from authentic sources, or which should have been deemed good authority, published at Cincinnati and Boston, showing only about two-thirds of that number, I was induced to think that the information was not obtained from reliable sources; as the receipts of barrel pork at New Orleans to the close of the last season was 550,600 bbls.; and my recent visit through the principal sections of the pork-packing country, has satisfied me that the number of hogs cut, west of the Alleghany mountains, for 1848–49, could not have been less than 2,050,000.

There has been this year the usual quantity packed for the European markets; and it should be recollected, from the many public improvements progressing in the Western States, and the consequent demand for that consumption, that a large proportion of the side pork and joints will not go into bbls., and will not reach an Eastern market.

I have no returns from the Missouri and Cumberland rivers, and shall have to estimate the quantity that has been packed there. Nearly all the pork cut on those rivers is made into bacon, and from the Missouri a large proportion will be required for the Californian emigrants.

There are a few other small points that I have no accounts from, but I believe the following will not vary much from the true number cut for 1849–50:—

OHIO.

Miami and Scioto valleys	122,000
Cincinnati	393,775
Ripley (estimated)	8,000
Total	523,775

KENTUCKY.

Maysville	14,000
Louisville (including Jeffersonville and New Albany)	184,000
Total	198,000

INDIANA.

Rising Sun and Aurora (estimated)	16,000
White Water Canal	62,000
Lawrenceburgh (estimated)	8,000
Madison	86,709
Indianapolis	14,000
Evansville	14,500
White River	16,000
Vincennes	14,500
Terre Haute	59,566
Durkey's Ferry	4,500
Clinton	13,000
Armiesburgh	3,500
Montezuma	3,000
Newport	3,700
Eugene	8,800
Perrysville	4,900
Covington	6,200
Williamsport	6,000
Attica	8,100
Independence	600
Lafayette	39,200
Jefferson	4,500
Frankfort	1,900
Americus	900
Delphi	9,600
Logansport	5,000
Peru	2,800
Wabash	4,500
Huntington	300
Lagro	2,200
Laporte	2,000
Michigan City and vicinity	2,100
Total	428,575

ILLINOIS.

On the Wabash and Illinois Rivers.

Darwin	3,500
York and vicinity	1,000
Hendersonville	3,600
Mt. Carmel and vicinity	5,500
Shawneetown	12,000
Ottawa	1,700
Peru	1,500
Princeton	3,700
Hennepin and Warren	3,500
Lacon	11,500
Chillicothe	3,800
Peoria	21,000
Galesburgh	1,200
Washington	1,000
Spring Bay	500
Pekin	26,000
Westley	300
Tremont	1,000
Canton	19,000
Liverpool	400
Lewiston	750
Springfield	19,500
Lindville	1,500
Winchester	2,500
Exeter	2,000
Beardstown	31,000
Naples	6,500
Meredocia	9,000
Lancaster and Farrington	6,800
Ellisville	1,200
Abbington	800
Florence and Pittsford	3,000
Perry	3,000
Greggsville	6,000
Havanah	350
Brushville, Macomb, and Frederick	9,000
Lagrange	2,000
Alton, on the Mississippi	30,000
Chicago, winter packing	11,500
Total	268,100

MISSISSIPPI RIVER.

Chester	1,000
Sparta (back)	1,500
St. Louis (10,000 steamed early in the fall)	124,000
Hannibal	24,500
Quincy	29,000
Warsaw	3,000
Keokuk	19,000
Burlington	29,000
Bloomington	3,500
Oquawka	1,200
Monmouth	1,200
Kuthsburgh	4,000
Rock Island	3,000
New Boston	1,000
Hampton	3,000
Wapolis	5,000
Total	252,900

RECAPITULATION.

Ohio	523,755
Kentucky	198,000
Indiana	428,575
Illinois	268,100
Mississippi River	252,900
Missouri River (estimated)	75,000
Cumberland River (estimated)	100,000
Other small points overlooked	25,000
Grand Total	1,871,330
City of Baltimore in 1848–49	150,000
" " " 1849–50	100,000

Yours respectfully,
L. CADWELL.

Hon. Thomas Ewbank,
Commissioner of Patents.

IMPORTS OF BREADSTUFFS INTO GREAT BRITAIN.

An Account of the Total Quantity of Wheat and Wheat Flour imported into Great Britain from Ireland, from 1801 *to* 1825.

Year.	Qrs. (8 Bus.)	Year.	Qrs. (8 Bus.)	Year.	Qrs. (8 Bus.)
1801	150	1810	126,388	1818	105,179
1802	108,751	1811	147,245	1819	153,850
1803	61,267	1812	158,352	1820	403,407
1804	70,071	1813	217,154	1821	569,700
1805	84,087	1814	225,478	1822	463,004
1806	102,276	1815	189,544	1823	400,068
1807	44,900	1816	121,631	1824	356,384
1808	43,498	1817	55,481	1825	396,018
1809	66,944				

The Quantity of Corn, Meal, and Flour, imported into Great Britain from Ireland, in the Years 1826 *to* 1849.

Year.	Wheat.	Oats.	Barley.	Beans & Peas.	Malt.	Oatmeal.	Wheat Flour.
	Qrs.	Qrs.	Qrs.	Qrs.	Qrs.	Cwt.	Cwt.
1826	241,925	1,179,896	64,885	8,642	1,203	194,602	255,240
1827	468,820	1,946,339	67,791	11,319	572	438,966	618,313
1828	474,994	1,805,366	84,204	11,894	853	424,749	621,569
1829	340,084	1,417,729	97,140	14,879	2,011	402,127	626,268
1830	337,641	1,226,486	189,745	21,573	2,820	....	672,265
1831	407,714	1,286,254	185,489	19,171	10,888	581,371	524,318
1832	552,740	1,662,786	123,639	16,445	8,220	611,412	831,434
1833	541,475	1,353,533	101,767	21,760	7,017	642,692	1,059,587
1834	462,229	1,277,598	217,855	20,947	3,865	772,994	1,110,463
1835	340,535	1,462,581	156,242	27,682	10,357	566,006	1,124,343
1836	249,360	1,627,324	184,156	20,524	22,214	675,470	1,169,200
1837	252,720	1,634,720	187,473	25,690	4,174	1,004,376	982,990
1838	209,600	1,946,050	156,467	26,816	5,001	1,252,741	1,168,195
1839	90,600	1,290,000	61,676	13,019	2,861	877,000	519,000
1840	92,990	1,397,500	95,954	15,976	3,456	989,500	280,700
1841	113,225	1,667,542	75,568	16,762	4,935	1,357,321	333,183
1842	112,400	1,275,200	50,200	21,450	3,050	1,549,500	313,500
1843	191,700	1,559,500	109,650	25,500	8,600	1,705,300	770,100
1844	200,200	1,509,000	90,700	19,600	8,000	1,150,000	839,000
1845	371,000	1,678,000	92,000	14,300	11,000	1,058,000	1,421,000
1846	187,300	956,000	93,000	17,000	11,000	554,000	725,000
1847	125,700	493,000	47,500	27,000	6,500	330,500	211,000
1848	146,000	1,081,000	79,700	14,700	6,300	936,600	561,000
1849	94,500	652,000	43,500	24,600	5,000	672,000	393,500

An Account of the Corn, Meal, and Flour, imported into Great Britain in each year, from 1st *Jan.* 1815 *to* 1849.

Year.	Imported from Ireland.	Imported from the British North American Colonies.	Imported from all other parts.	Total Imported.
	Qrs.	Qrs.	Qrs.	Qrs.
1815	821,192	25	333,041	1,154,258
1816	873,865	3	319,203	1,193,071
1817	695,651	25,877	1,715,353	2,496,881
1818	1,204,733	56,618	3,474,051	4,735,402
1819	967,680	14,257	1,693,255	2,675,192
1820	1,415,722	40,897	1,300,953	2,757,572
1821	1,822,816	40,916	216,738	2,080,470
1822	1,063,089	23,439	102,365	1,188,893
1823	1,528,153	209	53,432	1,581,794
1824	1,634,000	891	609,147	2,244,038
1825	2,203,962	95,059	962,118	3,261,739
1826	1,693,392	30,500	2,218,830	3,942,722
1827	2,828,460	61,035	2,550,310	5,439,805
1828	2,826,590	21,600	1,272,396	4,120,586
1829	2,307,244	7,335	2,680,414	4,994,993
1830	2,215,521	79,634	2,355,412	4,650,567
1831	2,429,182	225,240	3,316,760	5,971,182
1832	2,990,676	129,476	668,422	3,788,665
1833	2,737,441	117,745	336,524	3,191,710
1834	2,792,658	66,829	592,071	3,351,558
1835	2,679,438	25,016	296,189	3,000,643
1836	2,958,272	18,561	625,032	3,601,865
1837	3,030,293	19,060	1,306,870	4,356,223
1838	3,474,302	19,479	1,515,250	5,009,031
1839	2,243,151	17,438	4,573,660	6,834,249
1840	2,327,782	178,828	3,811,694	6,318,304
1841	2,855,525	308,382	3,378,599	6,542,506
1842	2,083,600	247,127	3,475,970	5,806,697
1843	2,721,400	146,647	1,299,776	4,167,823
1844	2,460,800	297,926	2,794,357	5,583,083
1845	2,292,800	312,438	2,118,707	5,423,945
1846	1,625,000	431,075	4,480,302	6,536,777
1847	879,900	546,431	11,769,728	13,196,059
1848	1,827,000	229,313	7,125,688	9,182,338
1849	1,175,000	210,510	10,616,338	12,001,848

COMMERCE OF THE UNITED STATES.

Commerce and Navigation.

We lay before our readers a condensed statement of the Commerce and Navigation of the United States with foreign countries, for the fiscal year of 1849, taken from the Official Report of the Register of the Treasury, laid before the Senate on the 26th December.

COMMERCE.

Statement of the Total Value of Goods, Wares, and Merchandize imported into the United States, in American and foreign vessels, during the year ending June 30th, 1849.

	In American Vessels.	In Foreign Vessels.	Total.
Paying duties	$103,293,220	22,186,554	125,479,774
Free of duty	17,088,932	5,288,733	22,377,665
Total	$120,382,152	27,475,287	147,857,439

Statement of the Total Commerce of the United States, from the 1*st of July*, 1848, *to* 30*th June*, 1849.

VALUE OF EXPORTS.

Domestic produce:	
In American vessels	$91,363,303
In foreign vessels	41,304,647
Total	$132,667,950
Foreign produce:	
In American vessels	$9,169,815
In foreign vessels	3,919,050
Total	$13,088,865
Total of American and foreign produce	$145,756,815

VALUE OF IMPORTS.

In American vessels	$120,382,152
In foreign vessels	27,475,287
Total	$147,857,439

Summary Statement of the Value of Domestic Exports during the year ending June 30, 1849.

THE SEA.

Dried fish, or cod fisheries	$419,092
Pickled fish, or river fisheries	93,085
Whale and other fish oil	965,597
Spermaceti oil	572,763
Whalebone	337,714
Sperm candles	159,403
Total	$2,547,654

THE FOREST.

Skins and furs	$656,228
Ginseng	182,966
Staves, shingles, boards, timber	1,776,749
Other lumber	60,344
Masts and spars	87,720
Oak bark and other dye	95,392
All manufactures of wood	1,697,828
Naval stores, tar, pitch, rosin, and turpentine	845,164
Ashes, pot and pearl	515,603
Total	$5,917,994

AGRICULTURE.

Beef, tallow, hides, horned cattle	$2,058,958
Butter and cheese	1,654,157
Pork (pickled), bacon, lard, and live hogs	9,245,885
Horses and mules	96,982
Sheep	16,305
Wool	81,015
Wheat	1,756,848
Flour	11,280,582
Indian corn	7,966,369
Indian meal	1,169,625
Rye meal	218,248
Rye, oats, and other small grain, and pulse	139,793
Biscuit, or ship-bread	364,318
Potatoes	83,313
Apples	93,904
Rice	2,569,362
Tobacco	5,804,207
Cotton	66,396,967
Hemp	8,458
Flax seed	4
Hops	29,123
Brown sugar	24,906
Indigo	49
Total	$111,059,378

Statement showing the Total Value of Exports during the Year ending June 30.

	In American Vessels.	In foreign Vessels.	Amount to each Country.
Russia	$864,621	$72,936	$937,557
Prussia	6,944	27,759	34,703
Sweden and Norway	117,132	608,149	725,281
Swedish West Indies	88,044	7,084	95,128
Denmark	175	54,963	55,138
Danish West Indies	678,578	48,619	727,197
Hanse Towns	738,125	1,992,123	2,710,248
Hanover	....	8,496	8,496
Holland	1,435,943	719,385	2,155,328
Dutch East Indies	257,188	23,635	280,823
Dutch West Indies	302,409	14,657	317,066
Dutch Guiana	100,966	3,017	104,013
Belgium	2,012,636	430,428	2,443,064
England	44,519,160	24,642,832	69,161,992
Scotland	1,880,969	1,668,991	3,549,960
Ireland	2,272,740	1,643,602	3,916,342
Gibraltar	678,335	45,484	723,819
Malta	28,119	23,114	51,233
British East Indies	332,962	....	332,962
Cape of Good Hope	94,422	....	94,422
Mauritius	7,884	13,847	21,731
Honduras	191,347	....	191,347
British Guiana	604,681	57,634	662,315
British West Indies	3,196,105	739,729	3,935,834
Canada	1,254,145	1,066,178	2,320,323
British American Colonies	916,851	2,694,932	3,611,783
France, on the Atlantic	10,069,418	1,577,194	11,646,692
France, on the Mediterranean	746,834	130,313	877,147
French West Indies	121,321	59,410	180,731
Miquelon and French Fisheries	20,370	....	20,370
French Guiana	44,504	1,657	46,161
Bourbon	9,473	....	9,473
Spain, on the Atlantic	157,812	12,259	169,071
Spain, on the Mediterranean	161,351	1,458,072	1,619,423
Teneriffe and other Canaries	17,840	....	17,840
Manilla and Phillipine Islands	137,868	....	137,868
Cuba	4,564,651	76,494	4,641,145
Other Spanish W. I	512,693	10,599	523,292
Portugal	105,614	64,107	169,021
Madeira	80,588	37,290	117,878
Fayal, and other Azores	14,204	....	14,204
Cape de Verd Islands	62,647	....	62,647
Italy	640,007	171,443	811,450
Sicily	16,459	7,900	24,359
Sardinia	320,310	140,640	460,950
Tuscany	26,800	3,276	30,076
Trieste, and other Austrian ports	727,105	215,384	942,489
Turkey, Levant, &c.	182,410	11,466	193,876
Hayti	485,082	47,494	532,577
Mexico	955,112	92,877	1,047,999
Central Republic	58,739	53,741	112,480
New Grenada	214,258	30,202	244,460
Venezuela	415,792	15,629	431,421
Brazil	2,701,120	137,260	2,838,380
Cisplatine Republic	105,113	29,525	134,638
Argentine Republic	435,714	159,804	595,518
Chili	1,641,047	81,410	1,722,457
Peru	93,195	....	93,195
China	1,460,945	....	1,460,945
West Indies generally	101,219	5,110	106,329
South America do.	85,215	....	85,215
Europe do.	....	18,588	18,588
Asia do.	344,436	....	344,436
Africa do.	609,871	66,898	676,769
South Seas and Pacific	336,660	....	336,660
Total	$91,363,308	$41,303,647	$132,666,955

UNITED STATES EXPORTS TO FOREIGN PORTS.

Foreign Exports of Wheat and Rye Flour, Corn Meal, Wheat, Corn, Rye, &c., and Ship Bread, from the United States, during the Year commencing 1st *July*, 1848, *and ending* 30*th June*, 1849.

EXPORTED TO	WHEAT.		FLOUR.		INDIAN CORN.		Rye, Oats, &c.
	Bushels.	Dollars.	Barrels.	Dollars.	Bushels.	Dollars.	
Russia	193	288	2	15	....	....	10,787
Sweden & Norway	....	....	110	515			
Swedish W. Indies	....	....	7,573	39,759	1,280	995	1,053
Danish West Indies	....	....	49,568	246,437	2,850	1,778	2,960
Hanse Towns	....	....	1,329	7,614	69	56	
Hanover	....	....	....	....	250	160	
Holland	....	....	727	3,789	....	....	440
Dutch East Indies	....	....	4,625	27,483	....	....	
Dutch West Indies	....	....	17,221	94,188	3,222	2,319	3,897
Dutch Guiana	....	....	3,349	18,813			
Belgium	....	....	....	....	180	70	
England	901,940	1,090,184	836,680	4,446,978	7,859,642	4,645,450	12,009
Scotland	67,626	85,249	45,608	239,502	345,316	214,845	5,894
Ireland	103,114	125,336	71,527	370,740	4,191,284	2,636,381	130
Gibraltar	....	....	6,262	32,839	6,505	2,994	
Malta	....	....	210	1,210			
British East Indies	....	....	791	4,875	....	....	1,500
Cape of Good Hope	269	355	4,720	28,274	....	....	35
Mauritius	....	....	500	3,447	593	433	2,625
Honduras	....	....	4,125	23,530	552	374	16
British Guiana	....	....	38,502	194,207	15,412	10,161	12,723
British West Indies	7,798	10,265	265,049	1,346,231	197,044	117,705	53,845
Canada	140,696	112,086	19,127	78,129	49,621	20,265	1,487
British Am. Colonies	305,383	332,765	294,891	1,518,922	221,442	126,791	9,072
France, on the Atlantic	108	100	....	....	....	....	63
French West Indies	....	....	5,554	28,684	5,372	2,778	3,369
Miquelon, and other French Fisheries	....	....	1,701	9,711	....	....	20
French Guiana	....	....	1,390	8,930	40	28	400
Bourbon	407	216	....	....	....	....	220
Teneriffe and other Canaries	....	....	15	73			
Manilla and Philippine Islands	....	....	60	388	....	....	
Cuba	....	....	7,154	39,247	12,631	7,117	8,392
Other Spanish West Indies	....	....	6,429	33,047	928	627	482
Madeira	....	....	4,358	23,171	93,823	59,072	
Cape de Verds	....	....	501	3,109	520	345	369
Italy	....	....	....	....	....	....	
Trieste, &c.	....	....	75	575			
Turkey, Levant, &c	....	....	50	300			
Hayti	....	....	10,903	59,183	270	186	74
Mexico	....	....	11,633	59,471	223,506	100,596	1,711
Central Republic	....	....	1,480	7,922	367	200	35
New Grenada	....	....	3,070	15,727	2,498	1,074	350
Venezuela	....	....	29,181	149,583	15,647	9,453	1,381
Brazil	....	....	314,808	1,885,203	500	366	750
Cisplatine Republic	....	....	13,321	70,352	2,085	1,402	87
Argentine Republic	....	....	6,592	35,936	....	....	6
Chili	....	....	5,129	33,004	....	....	697
Peru	....	....	1,050	4,716			
China	....	....	1,177	7,493	....	....	98
W. Indies generally	....	....	3,984	21,546	3,860	2,348	2,613
S. Amer. generally	....	....	....	....	....	....	
Asia generally	....	....	105	645			
Africa generally	....	....	4,617	27,670	....	....	173
S. Seas and Pacific	....	....	1,180	7,415	....	....	30
Total	1,527,534	1,756,848	2,108,013	11,280,582	13,257,309	7,966,369	139,793

Foreign Exports of Wheat and Rye Flour, Corn Meal, Wheat, Corn, Rye, &c., and Ship Bread, from the United States, during the Year commencing 1st *July*, 1848, *and ending* 30*th June*, 1849.

EXPORTED TO	INDIAN MEAL.		RYE MEAL.		SHIP BREAD.		
	Barrels.	Dollars.	Barrels.	Dollars.	Barrels.	Kegs.	Dollars.
Sweden & Norway	....	....	....	....	....	32	41
Swedish W. Indies	2,778	7,992	1,007	3,439	573	55	1,604
Danish West Indies	28,645	85,753	625	2,154	2,859	668	8,611
Holland............	....	....	....	....	140	....	387
Dutch East Indies	....	....	....	....	325	495	1,719
Dutch West Indies	1,567	4,700	1,297	4,497	1,247	176	4,010
Dutch Guiana.......	219	631	....	....	201	....	770
Belgium...............	....	....	....	....	75	....	300
England...............	62,399	185,028	22	77	2,979	346	8,913
Scotland..............	1,773	5,321	....	....	58	....	150
Ireland................	36,266	84,063	....	....	575	....	1,495
Gibraltar..............	....	....	....	....	180	20	549
Malta..................	....	....	....	....	200	....	523
British East Indies	....	....	....	....	190	....	750
Cape of Good Hope	....	....	....	....	247	....	485
Honduras.............	....	....	....	....	875	....	2,856
British Guiana......	10,627	30,644	50	163	12,237	50	33,781
British West Indies	99,863	284,065	3,497	12,191	37,726	1,870	123,013
Canada................	1,734	3,868	....	....	632	....	2,528
British Am. Colonies	153,979	434,109	57,166	191,582	25,467	1,645	78,882
France, on the Atlantic................	1	4	....	....	50	....	71
French West Indies	524	1,644	....	....	138	1	454
Miquelon, and other French Fisheries	25	78	....	....	210	....	505
French Guiana......	....	....	20	68	20	....	52
Teneriffe and other Canaries...........	....	....	....	....	3	109	100
Manilla and Philippine Islands	....	....	....	....	280	200	1,146
Cuba...................	431	1,152	....	....	1,727	1,904	7,256
Other Spanish West Indies..............	6,850	19,630	17	66	3,122	2,928	10,087
Madeira..............	300	804	532	1,985	10	125	106
Cape de Verds......	....	....	....	....	1,431	....	5,614
Italy...................	....	....	....	....	12	....	30
Hayti..................	65	356	....	....	322	110	1,399
Mexico................	....	....	....	....	4,230	853	11,372
Central Republic...	1,280	2,700	....	....	183	....	401
New Grenada........	203	560	....	....	801	451	2,740
Venezuela............	4,841	14,175	146	546	633	195	2,587
Brazil..................	210	711	....	....	646	6,055	9,172
Cisplatine Republic	35	105	....	....	522	345	1,670
Argentine Republic	....	....	451	1,480	389	260	1,696
Chili...................	168	430	....	....	1,341	1,123	6,236
Peru...................	....	....	....	....	250	550	1,329
China..................	....	....	....	....	2,705	....	10,064
W. Indies generally	249	710	....	....	96	84	313
S. Amer. generally	....	....	....	....	50	....	176
Asia generally......	....	....	....	....	65	....	256
Africa generally....	68	206	....	....	2,430	765	9,635
S. Seas and Pacific	58	186	....	....	2,911	40	8,484
Total...............	405,169	1,169,625	64,830	218,248	11,137	21,378	364,318

Treasury Department.—Total value of Exports $22,895,783.
Register's Office, Dec. 24th, 1849.

NAVIGATION.

Statement, showing the Number, and Class, of Vessels built, and the Tonnage thereof, in each State and Territory of the United States, for the Year ending June 30, 1849:

	CLASS.						Total tonnage.	
	Ships	Brigs	Schooners	Sloops and canal boats	Steamers	Total number of vessels built	Tons	95ths
Maine	119	107	105	6	7	344	82,255	56
New Hampshire	8	...	4	...	...	12	6,265	89
Vermont	...	...	...	...	...	...	....	
Massachusetts	38	7	65	9	1	113	23,888	48
Rhode Island	8	8	4	3	...	23	2,760	28
Connecticut	2	1	38	14	1	56	5,066	26
New York	17	8	64	155	21	265	44,104	26
New Jersey	...	1	57	27	2	87	8,025	55
Pennsylvania	3	2	27	102	63	197	24,207	73
Delaware	1	...	16	5	...	22	1,880	36
Maryland	9	9	129	...	5	152	17,462	98
District of Columbia	...	...	...	22	...	22	609	20
Virginia	1	2	32	1	2	38	3,094	65
North Carolina	1	1	24	3	...	29	3,032	27
South Carolina	...	...	6	...	2	8	655	57
Georgia	...	1	...	...	1	2	756	37
Florida	...	...	1	...	...	1	119	88
Alabama	...	...	2	1	...	3	106	54
Mississippi	...	...	...	...	...	...	....	
Louisiana	...	...	1	4	4	9	1,755	48
Tennessee	...	...	...	...	2	2	242	79
Kentucky	...	...	...	...	34	34	8,423	33
Missouri	...	...	...	8	11	19	2,886	51
Illinois	1	3	9	...	...	13	2,210	84
Ohio	...	2	9	8	44	63	12,816	92
Michigan	...	...	15	2	8	25	5,148	66
Texas	...	...	...	...	...	...	....	
Oregon	...	...	...	...	...	...	....	
Total	198	148	623	370	208	1547	256,577	47

It is seen that, in point of amount of tonnage, Maine is highest; New York, second; Pennsylvania, third; Massachusetts, fourth; Maryland, fifth; Ohio, sixth; Kentucky, seventh; New Jersey, eighth.

Of the inland States, Ohio has built the largest amount.

The amount built in the several inland States was as follows:

	Tons.
Ohio	12,816
Kentucky	8,423
Michigan	5,148
Missouri	2,886
Illinois	2,210
Tennessee	242
	31,725

In addition, there were built, at Pittsburgh, in Pennsylvania, about 60 steamers. We have no means at hand of ascertaining the proportion of the New York tonnage built on the lakes.

The tonnage of the principal ports of the United States was as follows:

Ports.	Tons.	95ths.
New York	796,491	79
Boston	296,890	04
New Bedford	123,911	57
Bath	88,820	84
Portland	84,568	80
Philadelphia	188,057	21
Baltimore	134,025	66
New Orleans	240,206	24
Charleston, S. C.	29,285	48
Wilmington, N. C.	16,641	87
Norfolk, Va.	23,016	26
Mobile	25,067	79
Buffalo	40,667	34
Pittsburgh	35,770	63
Detroit	33,466	94
St. Louis	32,255	08
Cuyahoga	30,047	11
Oswego	22,151	68
Chicago	17,832	43
Cincinnati	16,897	74

From this it is seen that the registered tonnage of 12 sea-port cities, including New Orleans, is 2,047,477 tons, against 228,585 tons, at eight inland cities. Of the latter, 84,922 tons belong to Cincinnati, Pittsburgh, and St. Louis.

The value of some of the principal articles of agriculture and manufactures exported, we compare with the exports of 1848:

ARTICLES.	VALUES. 1848.	1849.
Beef, tallow, hides, and horned cattle	2,474,208	2,058,358
Butter and cheese	1,063,087	1,654,157
Pork, (pickled,) bacon, lard, and live hogs	3,883,884	9,245,885
Wheat	1,681,975	1,756,848
Flour	11,668,669	11,280,582
Indian corn	1,186,663	7,966,369
Indian meal	945,081	1,169,625
Tobacco	8,478,270	5,804,207
Hemp	....	8,458
Soap, and tallow candles	630,041	627,280
Snuff and tobacco	695,914	613,034
Iron, (pig,) bar, and nails	122,225	149,358
Cotton, printed and colored	380,549	466,574
Cotton, white	1,978,831	3,955,117
Cotton, nankeen	848,189	3,203
Cotton, twist, yarn, and thread	81,313	92,555
All manufactures of cotton	255,799	415,680

The greatest increase, in any article of agriculture, was in the product of the hog. In the exports of cotton goods, the figures show a most satisfactory increase.

In order to show the comparative extent of our commerce with the several nations, we give the total value of the exports to some of the principal countries:

Russia	$ 937,557
Prussia	34,703
Sweden and Norway	725,281
Danish West Indies	727,197
Hanse Towns	2,710,248
Holland	2,155,328
Belgium	2,443,064
England	69,161,992
Scotland	3,549,960
Ireland	3,916,342
British West Indies	3,935,834
Canada	2,320,323
France—on the Atlantic	11,646,612
France—on the Mediterranean	877,147
Spain	1,619,423
Cuba	4,641,145
Mexico	1,047,999
Brazil	2,838,380
Chili	1,722,457
China	1,460,945

The value of the exports to England, Ireland, and Scotland, exceeds, by $20,391,529, the exports to all other countries.

TERRITORIES.

Table showing the estimated surface of the Territories of the United States, north and west of the regularly organized States of the Union, and the portions of territory thereof, situated north and south of the parallel of 36 *deg.* 30 *min. north latitude.*

TERRITORIES.	Square Miles north of the parallel of 36° 30′.	Square Miles south of the parallel of 36° 30′.	Total Square Miles.
Oregon Territory, bounded on the north by the parallel of 49° north latitude, south by the parallel of 42° north latitude, east by the Rocky Mountains, and west by the Pacific Ocean	341,463	...	341,463
Territory north and west of the Mississippi river, bounded on the north by the parallel of 49° north latitude, east by the Mississippi river, south by the State of Iowa and the Platte river, and west by the Rocky Mountains	723,248	...	723,248
Wisconsin Territory, bounded east by the Mississippi river and north by the State of Wisconsin, being the balance remaining of the old Northwest Territory	22,336	...	22,336
Indian Territory, situated west of the States of Missouri and Arkansas, and south of the Platte or Nebraska river, held and apportioned in part for Indian purposes	190,505	58,346	248,851
Territory in Upper California and New Mexico,* situated west of the Rio Grande to its source, and of a meridian line thence to the parallel of 42° north latitude, ceded to the United States by the treaty with Mexico of 1848	321,695	204,383	526,078
Total	1,599,247	262,729	1,861,976
That part of Texas which lies east of the Rio Grande and west of the Nueces river, from the mouth of the former river up to a line drawn from a point a short distance north of Paso to the source of the Ensenada river, is estimated at	...	52,018	52,018
And the part which lies north of Paso and the Ensenada river, up to latitude of 42° north	43,537	81,396	124,933
Making, together†	43,537	133,414	176,951

* This estimate excludes all that part of Texas which lies outside of its limits, as designated by the yellow shaded lines on Disturnell's Map of Mexico.

† This estimate, as will be seen, limits our acquisitions of territory from Mexico by the late treaty, exclusively to those portions of country lying west of the Rio Grande.

Texas in three Divisions.

	Square Miles.
1st. Between the Sabine and Nueces rivers, south of Ensenada river, (Texas proper)	148,569
2d. Between the Nueces and Rio Grande, south of Ensenada river	52,018
3d. North of Paso and the Ensenada river, (Santa Fe country)	124,933
Total	325,520

1st. Number of miles of coast acquired by the annexation of Texas, from the mouth of the Sabine to the Rio Grande... 400
2d. Number of miles of coast on the Pacific, including Oregon and California. In California, 970; Oregon, 500; Straits of Juan de Fuca, 150 1,620

Total, including Texas 2,020

Table exhibiting the Areas of the several States and Territories of the United States, in Square Miles and Acres.

FREE STATES.	Square Miles.	Acres.	SLAVE STATES.	Square Miles.	Acres.
Maine	35,000	22,400,000	Delaware	2,120	1,356,800
Vermont	8,000	5,120,000	Maryland	11,000	7,040,000
New Hampshire	8,030	5,139,200	Virginia	61,352	39.265,280
Massachusetts	7,250	4,640,000	North Carolina	45,500	29,120,000
Rhode Island	1,200	768,000	South Carolina	28,000	17,920,000
Connecticut	4,750	3,040,000	Georgia	58,000	37,120,000
New York	46,000	29,440,000	Kentucky	37,680	24,115,200
New Jersey	6,851	4,384,640	Tennessee	44,000	28,160,000
Pennsylvania	47,000	30,080,000	Louisiana	46,431	29,715,840
Ohio	39,964	25,576,960	Mississippi	47,147	30,174,080
Indiana	33,809	21,637,760	Alabama	50,722	32,462,080
Illinois	55,405	35,459,200	Missouri	67,380	43,123,200
Michigan	56,243	35,995,520	Arkansas	52,198	33,406,720
Iowa	50,914	32,584,960	Florida	59,268	37,931,520
Wisconsin	53,924	34,511,360			
Total	454,340	290,777,600	Total	610,798	390,910,720
			Texas	325,520	208,332,800
			District of Columbia	50	32,000

Territory north and west of the Mississippi River and east of the Rocky Mountains.

	Square Miles.	Acres.
Bounded north by 49° north latitude, east by the Mississippi river, south by the State of Iowa and Platte river, and west by the Rocky Mountains	723,248	462,878,720
Indian Territory, situated west of the States of Arkansas and Missouri, and south of the Platte river	248,851	159,264,640
Old Northwest Territory, balance remaining east of the Mississippi river and north of Wisconsin	22,336	14,2[illegible],040
Total of old territory not organized into States	994,435	636,438,400

	Square Miles.	Acres.
Area of Free States	454,340	290,777,600
" Slave States	610,798	390,910,720
" District of Columbia	50	32,000
" Territories east of the Rocky Mountains	994,435	636,438,400
Total	2,059,623	1,318,158,720

Territory exclusive of old Territory east of the Rocky Mountains.

	Square Miles.	Acres.
Oregon	341,463	218,536,320
California	448,691	287,162,240
New Mexico*	77,387	49,527,680
Texas*	325,520	208,332,800
Total	1,193,061	763,559,040

* Taking the Rio Grande as the boundary.

	Miles.
Length of the Atlantic coast to the mouth of St. Mary's river...	1,450
Length of the Atlantic coast from St. Mary's river to Cape of Florida	450
Length of Gulf coast to the mouth of Sabine	1,200
Total	3,100

The new States are larger than some of the old ones.

The area of the State of California, according to an estimate made on Preuss's map of 1848, is 158,500 square miles.

Estimated surfaces of other States.			Square Miles.
California is about	3½ times larger than	Louisiana	46,431
"	2¼ "	Missouri	67,380
"	4¼ "	Kentucky	37,680
"	2½ "	Virginia	61,352
"	3½ "	New York	46,000
"	3½ "	Pennsylvania	47,000

	Miles.
The average distance of the sea coast from the eastern boundary of the new State of California, is	212
Total length from north to south	764
Length of sea coast	970

The surface of Deseret, estimated on Preuss's map, as follows:

	Square Miles.
Part situated in Oregon	20,000
Part situated in California Territory	340,000
	360,000
Part within proposed limits of State of California	70,270
Total	430,270

THE COTTON TRADE.

Comparative Statement of Receipts, Exports, and Stocks of Cotton, at the following places, at the dates annexed:

Ports.	Received since 1st Sept.		Exported to Great Britain since 1st Sept.		Exported to France since 1st Sept.		Exported to North of Europe since 1st Sept.		Exported to other Foreign Ports since 1st Sept.		Total Exports to Foreign Ports since 1st Sept.		Shipments to Northern Ports since 1st Sept.		Stock on Hand and on Shipboard.		Stock on Hand 1st Sept.	
	1849.	1848.	1849.	1848.	1849.	1848.	1849.	1848.	1849.	1848.	1849.	1848.	1849.	1848.	1850.	1849.	1849.	1848.
New Orleans ....Feb. 16.	552,617	654,931	143,833	276,546	52,725	55,151	6,130	19,620	36,037	43,849	238,725	395,166	129,212	92,741	215,440	227,011	15,480	37,401
Mobile ....Feb. 16.	252,745	372,844	46,605	101,720	19,831	28,743	......	5,769	5,932	13,000	72,368	149,232	45,125	58,790	133,689	171,295	5,046	23,584
Florida ....Feb. 14.	116,607	102,620	8,649	11,912	......	993	5,654	1,481	......	1,310	14,303	15,696	53,804	40,028	40,272	46,230	615	507
Texas ....Feb. 13.	16,268	14,853	513	......	......	......	......	499	......	......	513	499	12,202	8,649	1,924	4,143	452	747
Georgia ....Feb. 20.	237,755	227,697	56,209	85,218	8,402	11,106	1,648	1,305	200	......	66,459	97,629	105,367	86,580	69,745	50,312	11,500	10,050
South Carolina .....Feb. 22.	259,501	288,407	86,643	102,104	21,384	19,252	5,876	11,880	4,855	7,448	118,758	140,684	102,824	108,516	63,299	58,978	23,806	14,085
North Carolina .....Feb. 23.	......	2,364	......	......	......	......	......	......	......	......	......	......	6,314	2,364				
Virginia ....Feb. 1.	......	5,780	......	350	......	......	......	......	......	......	......	350	......	......	750	650	1,750	441
New York ....Feb. 26.	......	......	68,868	55,578	43,817	34,847	11,460	25,859	577	3,024	124,722	119,308	......	......	90,867	61,879	67,035	41,967
Other Ports ....Feb. 23.	......	......	723	2,629	......	173	401	169	1	265	1,125	3,236	......	......	......	......	15,250	16,030
Total ....Bales,	1,441,172	1,669,586	412,043	636,057	146,159	150,265	31,169	66,582	47,602	68,896	636,973	921,800	454,908	397,668	616,186	620,498	140,934	144,815
Increase	......	......	......	......	......	......	......	......	......	......	......	......	57,240					
Decrease	228,414	......	224,014	......	4,106	......	35,413	......	21,294	......	284,827	......	......	......	4,312	......	3,881	

Stock of Cotton in Interior Towns, not included in the Receipts:

	1850.	1849.
Augusta and Hamburg ....Feb. 1.	64,948	53,810
Macon, Georgia ....Feb. 1.	18,781	23,045
Griffin, Georgia		
Columbus, Georgia ....Feb. 9.	16,336	33,982
Montgomery, Alabama ....Feb. 11.	10,788	8,576
Columbus, South Carolina .....Feb. 1.	7,000	
Memphis ....Feb. 1.	7,688	

THE IRON TRADE.

The Supplies of Iron sent forward from the interior of Pennsylvania in 1848 and 1849, have been as follows:

1849—Route.	Bar and Sheet.	Pig and Scrap.	Castings&Blooms	Nails & Spikes.
	Lbs.	Lbs.	Lbs.	Lbs.
Chesapeake and Delaware Canal..	4,568,391	41,091,379	3,691,825	925,986
Delaware Canal, Bristol	61,696	58,552,532	466,384	742,041
Schuylkill Navigation	7,963,200	77,490,560	6,354,880	2,582,720
Columbia and Reading Railroads	10,209,500	2,063,300	1,578,900	2,794,400
Norristown Railroad................	4,448,060	5,935,600	2,020,416	
Totals	27,250,847	185,133,371	14,112,405	7,045,147

1848—Route.	Bar and Sheet.	Pig and Scrap.	Castings&Blooms	Nails & Spikes.
	Lbs.	Lbs.	Lbs.	Lbs.
Chesapeake and Delaware Canal..	14,988,260	88,713,098	5,536,410	1,370,293
Delaware Canal, Bristol	1,117,515	50,733,874	109,227	*1,338,415
Schuylkill Navigation	10,223,860	29,205,120	3,071,040	1,485,120
Columbia and Reading Railroads	18,730,700	7,347,400	4,229,705	7,119,600
Norristown Railroad................	5,866,288	2,564,108	1,672,780	1,672,785
Totals	50,926,123	178,563,600	14,619,162	12,986,213

* Including 1,337,225 pounds of wire.

OREGON LUMBER TRADE.

We have been favored with the following, as a correct list of the vessels and cargoes now loaded, or in progress of loading, at the Williamette and Columbia rivers, most of which are ready to sail for California as soon as the weather (which has been so smoky as to detain them for some time) will permit:

Madonna	130,000	feet, sold for $100 per M...	$13,000
Ocean Bird	135,000	" ....worth	13,500
Sacramento	115,000	" .... "	11,500
Huntress	340,000	" .... "	34,000
Henry	90,000	" .... "	9,000
Aurora	200,000	" .... "	20,000
Diamond	115,000	" .... "	11,500
J. W. Cater	90,000	" .... "	9,000
Anita	90,000	" .... "	9,000
H. M. Feidler	180,000	" .... "	18,000
	1,485,000		$148,500

The discovery of the gold mines affects the United States beneficially, in creating powerful communities on the Pacific. The East is brought into proximity with the North American continent. So far as the gold is concerned, we can only hold that which is due to our superior activity and industry. Oregon will furnish the miners with bread and shelter, and thus receive a large amount of the gold. A strong, healthy man can make more money, and enjoy more health and life, in Oregon, than in California.

Mechanics in Oregon earn $10 per day. Miners do not, on an average, earn more than that, and work only six months. The result is the same in money; but the man who works at his trade retains his health, and enjoys life. As to farmers, we quote the Spectator again:

"We hold this truth to be self-evident, that Oregon, so far as soil, climate, and health are concerned, stands unrivaled as an agricultural country. The whole question is, will it pay? We make the following estimate of what one may do, supposing he has a small farm improved and stocked: 25 acres wheat, 20 bushels per acre, at $2 per bushel, $1,000; 20 head of cattle, 500 pounds each, at 10 cents per pound, $1,000; increased value of farm by culture and improvement, $1,000; making an annual advance of $3,000."

THE PROVISION TRADE.

The following is a comparative statement of the import of Provisions at Liverpool from the United States from 1st September to 9th January, 1848–49 and 1849–50:

	1848–49.	1849–50.
Pork, bbls	2,161	2,765
Beef, tcs	6	333
Beef, bbls	3,979	3,479
Bacon, casks	203	92
Bacon, boxes	3,459	4,281
Lard, tcs	2,572	1,479
Lard, casks	795	60
Lard, bbls	16,396	11,323
Lard, kegs	27,458	52,760
Cheese, casks	3,300	2,087
Cheese, boxes	51,906	74,904
Tallow, hhds	105	1,999
Flour, bbls	170,819	545,513
Wheat, bushels	333,973	650,569
Corn, bushels	758,227	2,450,285

THE WOOL TRADE.

Receipts of Wool from the Interior, on the New York and Pennsylvania Canals, and at Boston per Western Railroad, for three years:

	1847.	1848.	1849.
N. Y. Canals, lbs	17,044,000	8,729,407	12,731,402
Pennsylvania Canals, lbs	4,251,987	2,930,136	5,113,075
Western Railroad	3,823,600	3,598,596	4,701,600
Total	20,149,587	15,264,136	22,606,078
Total imports	8,450,006	11,381,429	17,869,022
Total	28,609,592	26,645,566	40,475,100
Dom. expenditures	378,440	781,102	159,925

This very considerable increase in supply has been attended by a constant increase in price, and the year closes, as compared with its commencement, as follows:

January, 1849	34@36	41@34	28@30	25@27
do. 1850	42@48	38@70	36@38	34@35
Increase	8@12	7 @ 7	8 @ 8	8 @ 8

An increase of 50 per cent. in the quantities delivered at tide-water, has been attended with a rising of 25@30 per cent. in prices; the market closing with great activity, and advancing rates with very light stocks.

THE TEA TRADE.

Statement of Imports and Exports of Teas into the United States for the Years ending December 31.

Imports.	1849.	1848.
Hyson, lbs	651,610	767,419
Young Hyson	9,225,754	7,906,695
Hyson Skin	2,167,432	2,320,906
Twankay	662,402	970,698
Gunpowder	839,680	907,107
Imperial	690,722	813,511
Total Green	14,237,700	13,686,336
Total Black	5,999,315	3,815,652
Total Green and Black	20,236,916	17,503,988

Exports.	1849. From U. S.	1848. From N. Y. only.
Hyson, lbs	145,950	165,599
Young Hyson	42,780	48,952
Gunpowder	20,890	24,724
Imperial	20,850	23,436
Total Green	230,470	262,708
Total Black	186,650	194,212
Total Green and Black	417,120	456,920

THE WHALE FISHERY IN 1849.

Importations of Sperm and Whale Oil and Whalebone into the United States in 1849.

Ports.	Barrels of Sperm Oil.	Barrels of Whale Oil.	Pounds of Whalebone.
New Bedford	46,338	72,961	797,300
Fairhaven	10,806	18,998	150,100
Mattapoisett	780	19	
Westport	2,518	100	500
Dartmouth	8	28	
District of New Bedford	60,450	92,106	947,900
Falmouth	2,060	115	
Edgartown	118	2,742	18,800
Nantucket	17,887	6,461	68,200
Provincetown	924	277	
Boston	1,360	3,445	202,300
Lynn	383	1,580	
Somerset	140		
Fall River	856	8,049	140,600
Providence	2,317	4,542	30,200
Warren	2,384	10,626	61,500
Newport	1,055		
Stonington	1,628	15,334	97,500
Mystic	1,509	6,747	51,100
New London	1,949	38,030	301,100
Bridgeport	354	2,702	27,300
Sagharbor	1,797	37,579	186,400
Greenport	587	7,487	78,400
Cold Spring	299	8,697	68,600
New Suffolk	242	314	1,200
New York	195	1,655	
Quincy	....	4	
Total, 1849	100,944	248,492	2,281,100

Imports for	Barrels of Sperm Oil.	Barrels of Whale Oil.	Pounds of Whalebone.
1848	107,976	280,656	2,003,000
1847	120,753	313,150	3,341,680
1846	95,217	207,493	2,276,939
1845	157,917	272,730	3,167,142
1844	139,594	262,047	2,532,445
1843	166,985	206,727	2,000,000
1842	165,687	161,041	1,600,000
1841	159,304	207,348	2,000,000
1840	157,791	207,908	2,000,000
Average for 10 years	137,212	236,759	2,320,231

Exports of Whale Oil from the Port of New Bedford in the Year 1849.

	Gallons.
To Rotterdam, 3 vessels	143,900
To Cowes, &c., 2 vessels	89,875
Total	233,775

From Boston.

	Gals. Sp.	Gals. Wh.	Lbs. W. Bone.
To England	85,465	34,145	4,500
To West Indies, &c,	7,477	50,372	
To Holland		7,259	
To Gottenburg	753		
To Gibraltar		2,000	
Total	93,875	93,776	4,500

Statement of the Average Price of Sperm and Whale Oil and Whalebone, for Nine Years.

	Sperm Oil.	Whale Oil.	Whale Bone.
Average for 1849	$108\frac{9}{10}$	$39\frac{9}{10}$	$31\frac{4}{5}$
1848	$100\frac{1}{2}$	36	$30\frac{7}{8}$
1847	$87\frac{7}{8}$	$33\frac{3}{4}$	34
1846	88	$32\frac{7}{8}$	33
1845	$90\frac{1}{2}$	$36\frac{1}{2}$	40
1844	63	$34\frac{1}{2}$	$35\frac{3}{4}$
1843	73	$33\frac{3}{4}$	23
1842	94	$31\frac{3}{4}$	$19\frac{3}{4}$
1841	100	$30\frac{1}{2}$	19

NORTH-WEST COAST FISHERY.

1839	2 ships	averaged	1,400 bbls. =	2,800 bbls.
1840	3	do.	587 bbls. =	1,760 bbls.
1841	20	do.	1,412 bbls. =	28,200 bbls.
1842	29	do.	1,627 bbls. =	47,200 bbls.
1843	108	do.	1,349 bbls. =	146,800 bbls.
1844	170	do.	1,528 bbls. =	259,570 bbls.
1845	263	do.	953 bbls. =	250,600 bbls.
1846	292	do.	869 bbls. =	253,800 bbls.
1847	177	do.	1,059 bbls. =	187,443 bbls.
1848	159	do.	1,164 bbls. =	185,256 bbls.

In 1849, 150 ships are estimated to have cruised upon the North-west Coast, 50 of which only have yet been heard from, with an average catch of 1529 bbls.

Statement of Sperm and Whale Oil and Whalebone on hand in the United States, on the first day of January, for Six Years past.

	Barrels Sperm.	Barrels Whale.	Pounds Bone.
Jan. 1, 1850	3,760	13,000	440,000
1849	10,147	20,936	994,600
1848	5,696	29,126	921,500
1847	14,614	7,775	112,800
1846	40,701	5,221	211,000
1845	32,992	12,950	

Recapitulative Table of Vessels in the Whale Fishery, January 1, 1850.

	Tonnage.
New Bedford	77,138
Fairhaven	14,735
Westport	2,817
Dartmouth	111
Mattapoisett	1,760
Sippican	256
Wareham	374
District of New Bedford	97,191
Falmouth	1,106
Holmes's Hole	949
Edgartown	1,860
Nantucket	20,831
Provincetown	1,260
Lynn	720
Yarmouth	90
Quincy	100
Beverly	162
Somerset	137
Fall River	646
Warren	4,939
Providence	842
Newport	1,382
Stonington	5,877
Mystic	3,384
New London	15,909
Sagharbor	7,935
Greenport	3,059
New Suffolk	227
Cold Spring	2,878
Total	171,484
January 1, 1849	196,110
January 1, 1850	171,484
	24,626

Showing a diminution in the whaling fleet, during 1849, of 71 ships and 1 brig; and the addition of 1 schooner and the diminution of 24,626 tons. —(*New Bedford Shipping List.*)

TOBACCO INSPECTIONS, &c., AT NEW YORK.

Below is a correct statement of the Inspections of Leaf Tobacco at this port, from 1834, the time of the establishment of the Inspection Warehouse in this city, to the close of 1849, inclusive, and the Stocks at the Warehouse at the beginning of each month for 12 years.

INSPECTIONS.

	Kentucky. Hogsheads.	Va. and N. C. Hogsheads.	Ohio. Hogsheads.	Maryland. Hogsheads.	Total Hogsheads.
1834............	3,657	1,754	413	85	5,909
1835............	11,278	2,130	1,131	190	14,729
1836............	10,495	87	2,509	16	13,107
1837............	6,047	683	409	10	7,149
1838............	7,599	360	71	....	8,030
1839............	6,630	972	24	121	7,747
1840............	10,263	3,502	63	2	13,830
1841............	9,955	2,056	87	....	10,068
1842............	8,236	1,123	61	....	9,420
1843............	11,729	254	68	....	12,051
1844............	6,052	544	2	36	6,634
1845............	7,387	180	48	45	7,660
1846............	5,701	1,785	102	81	7,669
1847............	8,217	3,893	90	4	12,204
1848............	9,983	975	55	9	11,022
1849............	10,753	2,254	29	100	13,136

STOCKS.

	1839	1840	1841	1842	1843	1844	1845	1846	1847	1848	1849	1850
January..........................	1767	1090	3744	2497	2419	6219	4121	3355	2901	5200	5531	6064
February.........................	1286	1210	3433	2417	2400	6236	3990	3325	2612	5260	5295	
March............................	1204	1123	2700	2724	2055	5970	3860	3109	2456	5278	4903	
April............................	2070	1381	3035	2396	2209	5895	3668	2850	2348	5244	4414	
May..............................	2391	1034	3376	2188	2622	5809	3463	2536	2506	5737	4347	
June.............................	2704	1983	3772	1787	3517	5631	3765	2536	2425	5504	4153	
July.............................	3101	2544	4565	2314	4164	6210	3427	2438	2831	6238	5570	
August...........................	2639	3176	4174	2943	4222	5818	3486	2901	2934	7523	7042	
September........................	3391	4531	3575	3543	5580	5746	3747	3326	3854	8252	7986	
October..........................	3086	4465	3430	2934	6784	5336	4396	3996	5187	8530	8197	
November.........................	2234	4281	3072	2817	6441	4624	3594	3974	6136	7763	7146	
December.........................	1455	3552	2326	2343	6326	3875	3072	2914	5093	6266	6307	

MAINE.

TRADE OF CALAIS, (WASHINGTON COUNTY.)

The following statistics give the trade of Calais, as exhibited by records for the year 1849. This town is one of the largest in this county, and had, in 1840, a population of three thousand.

Arrivals at the Port of Calais for the Year ending Dec. 31st, 1849, 612 *Vessels*

IMPORTS.

Corn, bushels	83,118
Flour, bbls	22,413
Pork, bbls	2,883

Clearances during same Period, 608 *Vessels.*

EXPORTS.

Pine Boards, feet	10,542,000
Spruce Lumber, feet	27,349,000
Hemlock Lumber, feet	2,198,000
Laths	57,506,000
Pickets	2,654,000
Shingles	14,244,500
Hockmetor knees	18,902
Hemlock Bark, cords	707
Sugar box shooks	5,676
Potatoes, bbls	1,246

The season of 1849 was very unfavorable to the manufacturing of lumber, in consequence of the great drought, and it is very certain that the exports of lumber in good sawing seasons will much exceed that of 1849.

ESTIMATE OF LUMBER TRADE ON MACHIAS RIVER, 1849.

Surveyed and Sold at East Machias.

Boards and Scantling, feet	8,300,000
Laths	10,500,000

Surveyed and Sold at Machias.

Boards and Scantling, feet	7,800,000
Laths	10,000,000
Shingles	125,000

Surveyed and Sold at Whitneyville.

Boards and Scantling, feet	7,300,000
Laths	9,150,000
Shingles	100,000

The lumber manufactured at Whitneyville is transported by steam, over railroad, a distance of seven miles, to Machias Port, taken thence by vessels at any season of the year.

COMMERCE OF PORTLAND.

Arrivals.

The number of Arrivals from foreign ports in 1848 and 1849 was:

	1848.	1849, to Sept. 30.
American vessels	120	91
Foreign vessels	195	242
Total	315	333
Tonnage	41,185 15	46,500 27

Clearances.

The whole number of Clearances for foreign ports, for 1848 and 1849, was

	1848.	1849, to Sept. 30.
American vessels	187	126
Foreign vessels	190	244
Total	377	370
Tonnage	53,959 60	52,177 53

Imports.

The Imports from Foreign ports, in 1848 and 1849, were:

	1848.	1849, to Sept. 30.
In American vessels	$538,576	$338,903
In Foreign vessels	77,469	90,399
Total	$616,045	$429,302

Exports.

The Exports in 1848 and 1849 were:

	1848.	1849, to Sept. 30.
Foreign merchandise in American vessels	$292	$13,560
Do. do. Foreign vessels	1,297	959
Domestic produce in American vessels	608,671	387,183
Do. do. Foreign vessels	12,979	21,557
Total	$623,239	$423,259

Imports into Portland Coastwise, of Flour and Corn.

	Flour, bbls.	Corn, bush.
In 1844	60,806	103,134
1845	74,447	153,764
1846	80,000	130,000
1847	82,700	125,000
1848	119,400	232,123
1849	153,814	194,267

By comparing the Flour receipts for the several years as set down above, it will be seen that there has been a large increase in this department of business in our city, and that the amount received last year is nearly double that of 1847.

The average receipts of Corn for the same period have been about the same for each year.

Vessels Built in the District of Portland and Falmouth in 1849.

Ships	11
Barques	8
Brigs	6
Schooners	6
Tonnage	10,179

There are several new vessels in dock finishing, the aggregate tonnage of which will not fall much, if any, short of 2500 tons, so that the whole amount of tonnage built in the District the past year, may be put down at twelve thousand five hundred tons.—(*Portland Advertiser.*)

Vessels Built in the District of Waldoboro' in 1849.

	Vessels.	Tons.
Waldoboro'	18	4,066 87
Warren	10	3,713 03
Thomaston	4	2,418 41
East Thomaston	8	2,866 81
South Thomaston	5	1,310 01
Damariscotta	5	3,438 06
Newcastle	7	4,453 33
Bristol	7	1,043 45
St. George	4	656 68
		23,965 55

This statement exhibits an increase over any former year.

Vessels Built in the District of Bath in 1849.

	No. of Vessels.	Tons.	Average Tonnage.
Ships	27	18,316 21	678 32
Barques	7	2,513 05	359 01
Brigs	5	844 93	169 06
Schooners	4	544 80	136 20
Steamer	1	44 11	

BANGOR LUMBER TRADE.

The amount of lumber surveyed at Bangor in the season of 1849, was 160,418,808 feet. Of this, the green lumber consisted of Pine, 74,176,561 feet; Spruce, 23,619,349 feet; Hemlock, &c. 2,562,587 feet—making 100,358,697 feet in all. A correspondent of the Bangor Whig says of the remainder, 60,060,111 feet, that it included lumber piled last season, likewise that piled out during the present season, together with lumber hauled from the interior. The amount piled out this season, including that from the adjacent towns, hauled to market on teams, will not probably exceed 8,000,000, leaving a balance of 52,000,000 piled out last season (1848).

MASSACHUSETTS.

COMMERCE OF BOSTON.

The Boston Shipping List, of the 2d inst., contains its usual annual statement of the business of that port for the year 1849, from which we gather such facts as will most interest the general reader.

The arrivals of vessels from foreign countries, for a number of years, show a steady increase. They were as follows:

1845	2,330	1847	2,755
1846	2,052	1848	3,101
1849	3,183		

The coastwise arrivals and the clearances, as far as known, were as follows:

Year.	Arrivals.	Clearances.
1849	6,199	3,174
1848	6,118	3,187
1847	7,125	3,198
1846	6,775	2,672
1845	5,631	3,054

IMPORTS IN 1849.

Cotton.

The imports in 1849 were as follows:

From New Orleans	bales, 122,773
Mobile	48,291
Charleston	27,469
Savannah	34,935
Apalachicola	32,573
Galveston	2,707
Other places	1,245
Total—1849	270,693
1848	239,958
1847	198,932

Leather.

The imports of Sole have been as follows:

	Sides.	Bundles.
From New York and Albany	190,585	1,124
Baltimore	23,099	13,736
Philadelphia	3,011	5,781
Maine	18,184	937
Alexandria	58	503
Georgetown	......	163
New Orleans	......	3,293
Apalachicola	......	40
Newbern, N. C	334	......
By Western Railroad	103,871	15,858
Total—1849	339,142	41,425
1848	582,053	25,791
1847	658,004	26,686

Boots and Shoes.

In connexion with the above, the following statement shows the quantity of Boots and Shoes cleared at the Custom-house, mostly for Southern Ports:

1849	cases,	101,371
1848		79,118
1847		72,424

Flour and Meal.

The receipts of Flour have been as follows:

From New York	bbls.	107,016
Albany		57,916
Western Railroad		343,507
Fitchburg Railroad		200
New Orleans		265,420
Fredericksburg		32,452
Georgetown		23,212
Alexandria		19,337
Richmond		72,539
Other places in Virginia		3,930
Philadelphia		35,120
Baltimore		55,393
Other places		10,267
Total—1849	bbls.	1,026,309
1848		935,578
1847		1,027,719

The receipts of Corn Meal for three years have been as follows:

1849	bbls.	28,185
1848		41,144
1847		25,080

Grain.

The receipts of Corn in 1849 were:

From New Orleans	bush.	208,359
Ports in Virginia		963,173
Maryland		685,215
Pennsylvania		280,500
Delaware		85,486
New York		544,119
Other places		22,466
Total, 1849		2,789,318

The receipts of Corn and Oats have been as follows:

		Corn.	Oats.
1849	bush.	3,789,318	449,324
1848		3,338,293	384,368
1847		2,584,528	521,738

The receipts of Wheat, Rye, and Shorts, have been as follows:

		Wheat.	Rye.	Shorts.
1849	bush.	510,671	40,478	66,258
1848		336,247	65,189	48,988
1847		171,127	50,256	83,620

Gunny Bags.

The imports have been as follows:

		Bales.	Bundles.	No.
1849	bush.	14,071	6,043	156,150
1848		15,530	7,375	572,372
1847		8,830	3,364	193,064

Hides.

The imports have been as follows:

Buenos Ayres, Rio Grande, and Montevideo		No. 339,291
Rio Janeiro		31,683
Valparaiso		34,055
Bahia		21,344
Other Foreign Ports		60,317
Coastwise Ports		85,386
Calcutta	bales, 2,477	....
Total—1849	2,477	572,076
1848	4,738	459,507
1847	1,902	472,962

Goat Skins.

The imports have been as follows:

	Bales.	No.
1849	5,750	33,255
1848	7,356	41,905
1847	4,788	38,455

Hemp.

The imports have been as follows:	Tons.	Bales.
From Russia	1,248	......
Manilla	......	28,005
New Orleans	......	6,191
Other Places	171	3,462
Total—1849	1,419	37,658
1848	1,322	51,285
1847	928	45,834

Lead.

The imports have been as follows:

1849	pigs, 180,365
1848	164,394
1847	157,767

Molasses.

The imports have been:

	Hhds.	Tcs.	Bbls.
Foreign	59,383	3,477	1,218
Coastwise	13,162	185	2,124
Total—1849	72,545	3,662	3,342
1848			83,434
1847			81,232

Naval Stores.

The receipts of Naval Stores have been:

	1849.	1848.	1847.
Rosin ....bbls.	28,596	9,825	10,141
Turpentine..................	37,906	23,006	56,729
Spirits Turpentine.........	10,965	5,514	7,895
Pitch.........................	2,844	405	2,774
Tar...........................	24,853	19,959	16,228

Sumac.

The receipts have been:

1849..bags,	30,050
1848..	34,524
1847..	19,070

Sugars.

The imports have been:

		1849.	1848.
From Foreign Ports	bxs.	41,502	64,894
Domestic Ports		6,231	7,767
Foreign Ports	hhds.	8,396	8,348
Domestic Ports		2,636	3,448
Foreign Ports	bags,	68,853	71,298
Domestic Ports		1,447	1,974
Foreign Ports	bbls.	1,140	721
Domestic Ports		16,362	5,243
Foreign Ports	bskts.	742	857

Tobacco.

The imports have been:

	Hhds.	Bales.	Bxs. & Kegs.
1849..........................	2,091	8,350	27,089
1848..........................	2,112	4,544	32,013
1847..........................	3,004	4,780	38,750

Wine.

The imports have been:

	Packages.	Gallons.
1849......................................	10,765	232,168
1848......................................	12,293	349,337
1849......................................	12,342	273,468

Wool.

The receipts of Domestic, by Western Railroad and water, have been:

	Bales.
1849..	23,808
1848..	17,698
1847..	19,618

The receipts of Foreign have been:

	Bales.	Quintals.
1849......................................	14,815	6,000
1848......................................	17,707	11,425
1847......................................	4,759	26,630

Provisions.

The receipts have been:

		1849.	1848.
Beef	bbls.	38,667	23,053
Pork		117,704	97,890
Hams	casks,	12,942	8,723
Hams	bbls.	5,803	8,594
Lard		58,906	52,619
Lard	kegs,	66,924	44,726
Cheese	casks,	6,623	7,239
Cheese	bxs.	94,536	49,680
Cheese	tons,	620	535
Hogs	No.	34,175	28,924

Rice.

The receipts have been:

1849	casks,	15,453
1848		11,447
1847		9,727

Salt.

The receipts have been:

From Great Britain	bush.	534,308
Other ports in Europe		409,648
West Indies		405,098
British American Colonies		27,170
Total—1849		1,376,224
1848		1,566,584
1847		1,370,976

EXPORTS IN 1849.

Cotton.

The exports to Foreign Ports, for three years past, have been as follows:

1849	bales,	4,308
1848		7,766
1847		6,477

Domestic Goods.

The exports to Foreign Ports have been as follows:

	Bales & Cases.	Value.
1849	33,309	$1,600,457 65
1848	50,952	2,266,392 84

Flour.

The exports have been as follows:

To Foreign Ports	bbls.	133,687
Coastwise Ports		20,246
Total—1849		153,933
1848		129,678
1847		186,728

Corn Meal.

The exports have been:

1849	bbls. 32,788
1848	42,849
1847	44,903

Grain.

The exports of Corn and Wheat have been as follows:

	Corn.	Wheat.
1849	bush. 325,768	524
1848	518,866	21,249
1847	568,025	14,853

Hops.

The exports to Foreign Ports have been as follows:

1849	bales, 391
1848	605
1847	455

Ice.

Exports to Foreign and Coastwise Ports:

1849	tons, 66,308
1848	57,507
1847	54,625

Lead.

The exports have been:

To Foreign Ports	pigs, 667
Coastwise Ports	1,107
Total—1849	1,774
1848	13,677
1487	8,978

Lumber.

The exports have been:

	Lumber.	Shingles.
1849	M. 28,011	10,851
1848	9,619	1,620
1847	8,373	2,557

Molasses.

Exported during past year:

	Hhds.	Tcs.	Bbls
To Foreign Ports	3,750	289	164
Coastwise Ports	12,031	535	572
Total—1849	15,781	824	736
1848	13,967	359	505
1847	29,586	2,700	1,253

Nails.

The exports have been as follows:

1849	casks,	72,077
1848		39,423
1847		46,321

Naval Stores.

The exports of Naval Stores from this Port for three years past have been as follows:

		1849.	1848.	1847.
Rosin	bbls.	16,568	15,077	25,130
Spirits Turpentine		1,892	2,328	4,123
Tar		10,285	6,192	5,857
Pitch		6,020	5,440	5,168
Turpentine		4,006	2,569	5,587

Provisions.

The exports to Foreign and Coastwise Ports have been:

			1849.	1848.
Pork,	Foreign	bbls.	27,455	18,460
	Coastwise		16,161	7,652
Lard,	Foreign		10,166	13,607
	Coastwise		1,746	3,197
	Foreign	kegs	28,430	31,771
	Coastwise		2,343	4,658
Beef,	Foreign	bbls.	6,589	6,644
	Coastwise		3,401	634
Cheese,	Foreign	boxes	10,107	6,233
	Coastwise		2,071	503
	Foreign	casks	201	200
	Coastwise		59	24

Rice.

The exports have been:

1849	casks,	4,787
1848		4,531
1847		4,227

Spirits.

The exports have been:

		Foreign.	Domestic.
1849	galls.	50,840	641,17[illegible]
1848		67,281	479,802
1847		18,371	400,706

Sugars.

The exports to Foreign Ports have been:

	Bxs.	Hhds.	Bbls.	Bags.
1849	9,717	521	1,554	1,249
1848	5,887	941	2,185	2,500
1847	5,450	272	3,292	360

Tallow.

Export for three years:

1849	bbls. 2,172
1848	3,244
1847	4,399

Tobacco.

The exports have been:

	Hhds.	Bales.	Bxs. & kegs.
1849	1,540	3,714	9,823
1848	1,619	2,534	9,108
1847	1,827	4,243	10,773

(*Boston Shipping List.*)

STATEMENT OF BRIGHTON MARKET FOR 1849.

46,465 Beef Cattle, sales estimated	$1,765,670
20,085 Stores	482,040
148,965 Sheep	297,910
80,120 Swine	430,645
	$2,976,265

1848.

40,784 Beef Cattle	Sales estimated at $2,830,302
20,553 Stores	
146,755 Sheep	
87,690 Swine	

1847.

43,425 Beef Cattle	Sales estimated at $2,719,462
20,738 Stores	
133,550 Sheep	
62,015 Swine	

1846.

38,670 Beef Cattle	Sales estimated at $1,871,113
15,164 Stores	
105,350 Sheep	
44,940 Swine	

NEW YORK.

ARRIVALS AT NEW YORK, 1849.

From Foreign Ports.

We are indebted for the following Statement of Foreign Arrivals at this Port, to the politeness of Mr. JAS. THORNE, Boarding Officer United States Revenue Department, Whitehall:

Steamers	76
Ships	787
Barques	725
Brigs	1,156
Galliots	9
Schooners	484
Total	3,237

Coastwise.

	Steamships	Ships.	Barques.	Brigs.	Schooners.	Total.
January	7	25	35	65	310	442
February	5	25	30	39	257	356
March	5	41	43	80	503	672
April	11	33	33	69	512	658
May	10	14	21	48	368	456
June	10	20	18	66	482	596
July	11	19	10	37	317	394
August	9	10	8	42	344	413
September	8	8	18	48	436	518
October	10	14	10	48	363	445
November	6	24	17	57	329	433
December	......	25	22	53	283	390

Whole number as above	5,773
Which added to the Foreign	3,237
Makes a total for the year of	9,010
Whole number last year	9,481
Decrease	471

NOTE.—In the above there are no Sloops included, which, if added to the many Schooners from Virginia and Philadelphia, with wood and coal, which, though consigned here, discharge their cargoes at Brooklyn, Williamsburg, Jersey City, and the adjacent towns on the Hudson, and are not boarded, owing to the remoteness of those points for general business, would make the number much greater. We estimate the *Schooners* that arrive at the above places, and are not reported, at six per day, which we think a small estimate; this would give for the year, 2190 additional Schooners to be added to the Coasting trade, making the whole number of Coastwise arrivals for 1849, 7963.

SUGAR AND MOLASSES.

Comparative Tables of the Imports of Sugar and Molasses at the Port of New York:

IMPORTED FROM	SUGAR. 1849. Boxes.	SUGAR. 1848. Boxes.	SUGAR. 1849. Hogsheads.	SUGAR. 1848. Hogsheads.
Havana	26,055	66,024	3,090	2,613
Matanzas	15,006	36,425	5,513	5,103
Cardenas	708	956	8,453	6,197
Sagua-la-Grande	2,299	2,068	9,206	9,545
San Juan	107	78	1,409	1,509
Cienfuegos	2,184	2,256	6,896	4,046
Trinidad	10,003	5,575	3,375	3,157
St. Jago	1,521	2,272	4,421	3,614
Neuvitas	1,364	3,324	2,210	1,905
Mansanilla and Santa Cruz	....	21	265	123
Total from Cuba	59,247	118,999	44,838	37,812
Porto Rico	....	....	25,599	29,292
St. Croix	....	....	1,420	1,462
Louisiana	....	....	44,172	34,818
Texas	....	....	2,465	722
Coastwise	2,440	4,018	8,914	5,379
Total	61,687	123,017	127,408	109,485
Decrease	61,330			
Increase	....	....	17,923	

Sugar.

Imported from		1849.	1848.
Manilla	bags,	55,616	69,719
Brazil		17,705	8,901
Coastwise		20,488	10,872
Total		93,809	89,492
Increase		4,317	

Molasses.

Imported from		1849.	1848.
Havana	hhds.	2,016	2,384
Matanzas		5,898	7,037
Cardenas		15,383	18,720
Mariel		1,091	1,253
Sagua-la-Grande		4,115	4,428
San Juan		591	380
Cienfuegos		2,442	1,967
Trinidad		6,446	6,569
St. Jago		197	301
Neuvitas		4,021	2,933
Mansanilla and Santa Cruz		959	865
Total from Cuba		43,159	46,837
Porto Rico		9,254	13,081
St. Croix		1,783	1,870
Louisiana		12,718	15,107
Texas		1,258	516
Coastwise		13,873	11,971
Total		82,045	89,382
Decrease		7,337	

Stock of Sugar, January 1st.

		1850.	1849.
Havana, &c	bxs.	1,699	14,127
San Juan	hhds.	859	1,321
Porto Rico	hhds.	568	508
Manilla	bags,	23,866	7,074
Brazil	bags,	764	
Louisiana	hhds.	1,945	2,720
Texas	hhds.	41	

IMPORTS OF NAVAL STORES.

Receipts of Naval Stores at New York, from Jan. 1, 1849, to Dec. 31, 1849.

Date.	Turpentine.	Tar.	Rosin.	S. Turp'ne.
January	7,132	3,784	23,751	5,095
February	5,401	3,428	6,658	2,691
March	20,602	4,920	12,411	5,090
April	16,492	12,913	35,123	7,724
May	7,261	9,012	24,079	4,956
June	12,028	5,878	30,241	5,886
July	11,368	1,775	23,040	5,608
August	17,859	2,681	22,333	6,580
September	21,709	2,312	15,232	7,899
October	19,261	4,671	27,810	5,977
November	6,329	3,506	17,933	3,797
December	10,673	3,914	23,131	4,886
	156,115	58,794	262,742	66,189
1848	204,015	41,140	171,884	57,295

Sundries.

		1849.	1848.
Turpentine	hhds.		109
Spirits Turpentine		33	162
Do. do	pipe,		1
Do. do	tcs.		55
Do. do	hlf. bbls.		21
Do. do	keg,	1	
Tar	hlf. bbls.	311	31
Tar	hhds.	2	
Rosin	tons,		175
Pitch	bbls.	1,177	3,160
Rosin Oil			75

Exports of Naval Stores from the Port of New York, for the year 1849.

	Turpentine. Bbls.	Tar. Bbls.	Rosin. Bbls.	S. Turpentine. Galls.
To Great Britain and Ireland	151,606	29,841	82,522	119,625
N. of Europe	2,706	583	34,533	161,463
Other places	606	5,510	26,549	36,998

EXPORTS OF BREADSTUFFS.

The annexed Official Statement exhibits the quantity of Flour and Grain exported from the Port of New York for the month of January, distinguishing the destination:

	Flour, U. States.	Flour, Canada.	Corn, U. States.	Wheat, Canada.	Meal, Puns.	U. States, Bbls.
London	491	1,590				
Liverpool	13,500	25,745	109,600	28,599		
Glasgow	2,878	1,932				
Ireland	......	......	6,063			
British N. Am. Colonies	1,558	600	400	5,700	......	1,113
British W. Indies	1,214	......	669	......	......	628
St. Domingo	1,944					
Spanish W. Indies	960	......	......	......	85	275
Danish W. Indies	390	......	......	......	375	125
Brazils	6,789					
Venezuela	525					
Dutch W. Indies	745					
Swedish W. Indies	320					
Total	31,314	29,867	116,732	34,299	460	2,181

It will be perceived that the shipments of Canada Flour were nearly equal to those of United States manufacture, and that the shipments of wheat were entirely Canadian.

COMMERCE OF PHILADELPHIA.

EXPORTS IN 1849.

The following is an Official Statement of the amount and value of the Exports from Philadelphia during the year ending 30th of September last:

	Amount.	Value.
Flour	bbls. 233,397	$1,187,584
Wheat	bush. 242,554	284,650
Corn	1,205,223	749,021
Corn Meal	bbls. 118,291	336,523
Rye Meal	26,351	82,060
Ship Bread	22,514	79,866
Ship Bread	kegs, 7,320	
Potatoes	bush. 4,508	3,371
Apples	bbls. 670	1,012
Rice	tcs. 2,301	48,174
Cotton	lb. 1,359,109	104,808
Tobacco	hhds. 1,196	67,813
Candles	lb. 7,358,471	148,870
Soap	1,153,968	
Snuff	190,074	49,639
Tobacco, Mfd	10,653	
Dried Fish	qtls. 2,660	6,887
Pickled Fish	bbls. 671	2,766

	Amount.	*Value.*
Beef	4,077	$87,573
Tallow	℔.274,316	
Pork	bbls.11,288	693,273
Hams	℔.5,591,428	
Lard	2,340,584	
Butter	546,292	80,852
Cheese	210,372	
Tar and Pitch	bbls.616	10,391
Rosin	6,423	
Sperm Oil	galls.2,909	3,180
Whale Oil	54,166	26,820
Sperm Candles	℔.90,731	28,991
Coal	tons,1,709	6,938
Bark	hhds.1,620	53,168
Pulse or Small Grain		11,011
Furniture		9,740
Manufactured Iron		104,947
Drugs		15,579
Domestic Cottons		166,071

Value of Exports from the Port of Philadelphia to Foreign Ports, for the year ending 30th September, 1849:

Fourth Quarter, 1848.		
In American vessels	$1,217,342	$1,516,448
In Foreign vessels	199,106	
First Quarter, 1849.		
In American vessels	$1,122,963	$1,239,722
In Foreign vessels	116,759	
Second Quarter, 1849.		
In American vessels	$1,188,672	$1,482,649
In Foreign vessels	293,977	
Third Quarter, 1849.		
In American vessels	$682,749	$915,238
In Foreign vessels	232,489	
Total for the year		$5,154,059

EXPORTS FOR EIGHT YEARS.

The following table shows the Exports of Wheat and Rye Flour, Corn Meal, Wheat and Corn, from this port annually, for the last eight years:

Year.	Wheat Flour. Bbls.	Rye Flour. Bbls.	Corn Meal. Bbls.	Wheat. Bush.	Corn. Bush.
1842	161,866	22,530	97,884	87,953	83,772
1843	28,517	22,303	106,484	32,235	74,613
1844	196,433	21,904	101,356	23,375	110,068
1845	201,956	17,098	115,101	86,089	129,256
1846	366,610	19,730	144,857	245,136	279,820
1847	420,684	20,407	300,531	523,538	1,102,210
1848	179,507	15,537	140,014	207,092	817,150
1849	220,786	26,536	91,349	177,312	906,823

COAL.

Sent to Philadelphia.

The comparative supplies of Coal sent from the mines in 1848 and 1849, have been as follows:

	1848.	1849.
Schuylkill mines, by Canal	436,602	486,075
do do by Railroad	1,216,232	1,112,438
Lehigh	680,193	800,987
Lackawanna	434,267	454,240
Wyoming	231,271	258,080
Shamokin,	19,357	19,658
Pine Grove	56,938	78,299
Lyken's Valley	2,000	25,000
Total, tons,	3,082,860	3,235,777
Increase of 1849 over 1848		152,917

Imports of Foreign Coal into the United States.

Official Statement of the amount and value of Coal imported into the United States during the year ending on the 30th of June, 1849:

Where from.	*Tons.*	*Value.*
England	63,079	$156,154
Scotland	1,469	2,721
Ireland	600	1,437
British Am. Colonies	131,565	245,693
Other places	1,500	3,277
Total	198,213	$409,282

The following table shows the imports of Foreign Coal into the United States, annually, from 1821 to the 1st of July, 1849. The duty on Foreign Coal under the present Tariff is 30 to 45 cents ℔ ton on board:

	Tons.		*Tons.*
1821	22,122	1836	108,430
1822	34,523	1837	153,450
1823	30,433	1838	129,083
1824	7,228	1839	181,551
1825	25,645	1840	162,867
1826	35,665	1841	155,394
1827	40,257	1842	141,526
1828	32,302	1843	41,163
1829	45,393	1844	87,073
1830	58,136	1845	85,771
1831	36,508	1846*	156,855
1832	72,978	1847†	148,021
1833	92,432	1848	196,251
1834	71,626	1849	198,213
1835	49,969		

(*Philadelphia Commercial List.*)

* From 1st December, 1846, to 30th June, 1847.
† For the year ending 30th June, 1848.

COMMERCE OF BALTIMORE.

The following is a statement of the foreign commerce of the port of Baltimore for the year 1849. It exceeds that of 1848 upwards of two millions of dollars:

Foreign merchandise imported in American vessels..........	$5,255,218
Do. do. do. Foreign vessels............	505,941
Total value of imports, year 1849..........................	$5,761,159

Exports of Domestic produce in American vessels............	$7,049,725
Do. do. do. Foreign vessels...............	1,374,401
Do. of Foreign mdse. in American vessels................	121,470
Do. do. do. Foreign vessels................	144,084
Total value of exports, year 1849..........................	$8,689,680

	No. Vessels.	Tons.	Men.
Entries of American vessels from foreign ports..........................	359	84,260	3,372
Entries of Foreign vessels from foreign ports..........................	137	27,882	1,246
Total entries, year 1849......	496	112,142	4,618
Clearances of American vessels to foreign ports..........................	461	111,026	4,620
Clearances of Foreign vessels to foreign ports..........................	163	34,523	1,636
Total clearances, 1849.........	624	145,549	6,256

The inspections of Flour in the city of Baltimore for the years 1848 and 1849 were as follow:

	1849.		1848.	
	Barrels.	Halves.	Barrels.	Halves.
Howard Street......................	472,565	4,109		
City Mills..............................	234,227	23,053		
Susquehanna.........................	16,272			
Family..................................	27,622	505		
Total..............................	750,686	27,667	627,078	25,953

Showing an increase in 1849 of 123,608 barrels and 2074 half barrels over 1848.

The inspections of Rye Flour and Corn Meal were as follow:

	1849.			1848.		
	Hhds.	Barrels.	Hf. Bbls.	Hhds.	Barrels.	Hf. Bbls.
Rye Flour.............................	....	8,007	9	....	5,094	65
Corn Meal.............................	428	51,772	2,051	129	45,451	1,044
Total.............................	428	59,779	2,060	129	50,545	1,109

SOUTH CAROLINA.

COMMERCE OF CHARLESTON.

Statement of Exports from the District of Charleston, of the Growth, Produce, and Manufacture of the United States, in American and Foreign Vessels, for the Year 1849.

Whither exported.	Boards, Plank, &c.	Naval Stores.	Cotton. Sea Island.	Cotton. Other.	Rice	Rough Rice.	Miscellaneous Articles.	Total to each Country.
	Feet.	Bbls.	lb.	lb.	Tcs.	Bush.	$	$
Russia	...	...	...	1,362,366	1,353	89,043	...	132,419
Sweden	14,415	...	...	593,704	457	59,889	...	125,271
Denmark and Norway	16,484	...	...	4,779	...	400	...	54,963
Holland	10,603	...	...	1,385,611	4,608	70,543	...	198,341
Belgium	106,705	...	...	3,147,988	2,835	235,216	...	382,829
England	584,382	14,254	4,176,711	66,525,252	11,721	...	12,739	6,490,178
Scotland	...	...	21,294	1,384,354	7	...	37	136,745
Gibraltar	30,366	...	...	...	260	...	...	5,966
British West Indies	316,490	...	...	...	1,011	16,000	5,647	28,779
Hanse Towns and Germany	131,429	1,569	...	2,213,651	12,789	21,721	...	432,566
France on the Atlantic	96,746	...	1,766,705	13,837,534	4,027	...	...	1,460,381
Spain on the Mediterranean	11,091	34	...	4,773,027	...	...	...	413,277
Honduras	71,757	...	...	...	...	...	...	1,000
Cuba	1,534,050	81	...	...	19,040	...	10,221	385,101
Italy and Malta	2,681	...	...	563,845	...	...	...	61,071
Trieste and other Austrian ports	...	...	...	267,011	...	...	...	18,640
Brazilian ports	50,110	...	...	...	...	...	...	1,046
Buenos Ayres	262,723	...	...	...	453	...	...	15,198
	3,240,032	15,938	5,964,710	96,059,122	58,561	492,812	28,644	10,343,771

COASTWISE EXPORTS.

First quarter, 1849	$1,294,363
Second quarter	1,169,972
Third quarter	1,139,536
Fourth quarter	1,890,649
Total coastwise	$5,494,520

FOREIGN EXPORTS.

In American vessels	$6,728,590
In Foreign vessels	3,615,181
Total Foreign	$10,343,771
Total Coastwise	5,494,520
Total value of Exports, Foreign and Coastwise, for the year 1849	$15,838,291

(*Charleston Mercury.*)

Agricultural and other Products that passed over the South Carolina Railroad, in 1849:

	COTTON.	CORN.	TUR'NE.
	Bales.	Bush.	Bbls.
From Hamburg and stations on road...	141,139	56,274	6,261
From Columbia and stations on road...	154,418	4,863	7,561
From Camden and stations on road.....	44,444	5,767	97
Total	340,001	66,904	13,919

In addition, from road generally—1,584 head of cattle, 3,353 hogs, 328 sheep, 977 horses, 1,507 barrels of flour, and 10,632 bales of domestics.

In publishing this statement, we would call the special attention of our readers to the item of 10,632 bales of domestics that have been transported over the road in one year. The amount astonished us, and, we have no doubt, will surprise most persons. It is a new feature in our resources, and must, in the natural course of events, increase with a rapidity that will astonish not only the distant consumers who will be supplied with Southern manufactures, but even our own citizens, who only recently turned their attention to this new source of wealth in the employment of their surplus labor. We grow the raw material—we have the mechanical ability, the capital, and the operatives. None can compete with us, if these advantages are used with judgment.

(*Charleston Courier.*)

IMPORTS INTO NEW ORLEANS FROM THE INTERIOR.

COMMENCING SEPTEMBER 1.

			1849.	1848.
	Bacon, assorted	hhds. & csks.	13,501	14,955
	Bacon, assorted	bbls. & bxs.	15,812	18,775
	Bacon, Hams	hhds. & tcs.	6,103	8,133
	Bacon, in bulk	lb.	70,100	130,000
	Bagging	pcs.	25,176	29,276
	Bale Rope	coils,	35,315	36,522
	Beans	bbls.	7,094	8,435
	Butter	kegs & firkins,	30,426	35,740
	Butter	bbls.	1,332	1,629
	Beeswax		207	186
	Beeswax	lb.		
	Beef	bbls.	36,616	31,229
	Beef	hhds. & tcs.	12,534	24,132
	Beef, Dried	lb.	41,900	20,300
	Buffalo Robes	packs,	326	9
COTTON.	La. and Miss	bales,	394,263	603,274
	Lake		7,164	10,353
	N. Ala. & Tenn		172,551	108,795
	Arkansas		32,061	25,698
	Mobile		7,063	20,179
	Florida		6,428	2,733
	Texas		3,045	1,907

Corn Meal	bbls.	3,116	8,968
Corn, in Ear		34,702	227,946
Corn, Shelled	sacks,	565,166	1,041,313
Cheese	bxs.	44,761	38,166
Coal, Western	bbls.	294,000	101,000
Dried Apples		1,417	2,165
Dried Peaches		514	463
Feathers	bags,	4,401	2,622
Flax Seed	tcs.	158	580
Flour	bbls.	316,167	687,638
Furs	bxs. & hhds.	2	
Furs	bdls.	363	64
Hemp	bales,	9,249	10,324
Hides	No.	19,986	13,963
Horns		3,600	
Hay	bales,	36,699	31,586
Iron, Pig	tons,	20	413
Lard	hhds.	206	389
Lard	tcs. & bbls.	157,288	128,666
Lard	kegs,	219,308	189,688
Lime, Western	hhds. & bbls.	7,846	2,692
Lead	pigs,	128,595	193,186
Lead, Bar	kegs & bxs.	274	437
Lead, White	kegs,	5,124	4,511
Molasses	bbls.	139,662	102,150
Oats	bbls. & sacks,	158,236	140,185
Oil, Linseed	bbls.	658	1,009
Oil, Castor		1,337	1,394
Oil, Lard		8,109	4,283
Oil, Cake	tons,	1,032	2,467
Potatoes	bbls.	123,512	98,634
Pork	bbls. & tcs.	416,662	398,056
Pork	bxs.	17,784	13,654
Pork	hhds.	11,926	15,473
Pork, in bulk	℔.	10,811,360	5,618,680
Skins, Deer	packs,	631	587
Shot	kegs,	2,677	2,605
Soap	bxs.	6,400	4,351
Staves	M.	1,734	542
Sugar	hhds.	103,264	80,054
Sugar	bbls.	5,191	2,371
Spanish Moss	bales,	911	1,394
Tallow	bbls.	4,368	5,021
Tobacco, Leaf	hhds.	11,667	8,036
Tobacco, Chewing	kegs & bxs.	828	1,870
Tobacco	bales,	81	19
Wool	bags,	554	433
Whiskey	bbls.	64,054	74,082
Wheat	bbls. & sacks,	42,079	155,565

IMPORTS OF FOREIGN MERCHANDISE.

COMMENCING SEPTEMBER 1.

		1849.	1848.
Coffee—Cuba, &c	bags,	13,736	6,234
Rio		126,908	218,672
Sugar—Havana	bxs.	4,873	10,527
Havana	hhds.		18
Salt—Liverpool	sacks,	266,461	327,743
Turks Island, &c	bush.	504,700	119,088

(*N. O. Price-Current, March* 6.)

In the above table, the falling off in the receipts of wheat, corn, flour, and meal, is the most noticeable feature. In 1848 there arrived at New Orleans 62,694 barrels of corn in the ear; in 1849 only 4,850. Corn meal fell from 4,395 barrels down to 477. Shelled corn in sacks fell from 710,558, to 325,973. In flour, the diminution was from 504,485 barrels in 1848 to 263,635 in 1849. Wheat in 1848 was 134,052 sacks, and in 1849 only 41,894. In oats and potatoes there is an increase. Pork in bulk shows a very large increase, being 51,000 lbs. in 1848, and 900,000 in 1849.

There is a large falling off in Louisiana and Mississippi Cotton. In Hay the increase is over 25 per cent.; in Lead the receipts are less, by more than 60,000 lbs. than the quantity arrived in 1849. Lead, and several other products of the Upper Valley of the Mississippi, particularly those of Wisconsin, Illinois, Indiana, and Ohio, seem inclined to seek the seaboard by the Northern Lakes. The receipts of Sugar increased over 11,000 hogsheads. There is a remarkable falling off in the quantity of Rio Coffee that entered the port of New Orleans in 1849, as compared with that of 1848. Her imports by the river for several years past, are thus set down:—

Year.	Produce Arrived.	Export of Produce.
1842	$45,716,045	$27,427,422
1843	53,728,054	26,653,924
1844	65,863,866	29,442,734
1845	57,199,122	25,841,311
1846	77,193,464	30,747,533
1847	90,033,256	41,788,303
1848	79,779,151	39,348,722

Here we find, from September 1st, 1845, to September 1st, 1847, an annual increase of western produce received at New Orleans, of 17 per cent.

The steamboat tonnage of New Orleans in 1842, as compared with other western cities, was as follows:—

Cities.	Tons.
New Orleans	80,993
St. Louis	14,725
Cincinnati	12,025
Pittsburgh	10,107
Louisville	4,618
Nashville	3,810

The steamboat tonnage of this city cannot now be less than 100,000 tons. What the ocean tonnage is, we cannot determine.

This port shipped staples of the North, for 1845–6 and 1846–7, to the following amounts:—

Flour.—1845–6, 573,194 barrels; 1846–7, 1,319,507 barrels.
Pork.—1845–6, 272,319 barrels; 1846–7, 230,520 barrels.
Bacon.—1845–6, 21,042 hogsheads; 1846–7, 25,904 hogsheads.
Lard.—1845–6, 790,904 kegs; 1846–7, 907,977 kegs.
Beef.—1845–6, 58,162 barrels; 1846–7, 51,906 barrels.
Lead.—1845–6, 718,285 pigs; 1846–7, 624,258 pigs.

Louisiana contains 45,350 square miles, or 29,024,000 acres. More than half this extent is unentered land and as good as any country can boast. The agricultural resources of Louisiana have scarcely begun to be developed, and she has room for a great increase in production and population for many years to come.

The following table exhibits the exports of cotton and tobacco from New Orleans, for the past twenty-six years:

Year.	Cotton in bales.	Tobacco in hogsheads.
1823	171,872	28,624
1824	143,843	25,910
1825	203,914	16,849
1826	250,681	18,231
1827	326,516	26,140
1828	304,073	35,098
1829	267,736	25,288
1830	351,237	28,028
1831	423,942	33,872
1832	358,104	35,056
1833	410,524	23,637
1834	461,026	25,210
1835	536,991	33,831
1836	490,495	41,604
1837	588,969	35,821
1838	738,313	35,555
1839	579,179	30,852
1840	749,320	40,436
1841	821,288	54,667
1842	949,320	68,058
1843	1,088,870	89,891
1844	895,375	81,249
1845	984,616	68,679
1846	1,054,857	62,045
1847	724,508	50,376
1848	1,201,897	60,364
26 years	14,877,413	1,085,771

Here is an export of 14,877,413 bales of cotton in twenty-six years. The total receipts for this period, were 15,134,541 bales, which, at $40 per bale, amount to $605,383,600. There was also exported 1,078,735 hhds. of tobacco, which amounts to $15,511,450, at $70 per hhd.—making a total of these two leading articles, of $680,895,050.

COMMERCE OF THE NEW YORK CANALS.

The cholera operated to check the movement of agricultural products on the Northern Lakes, and consequently on the Erie and Oswego Canals, some two months of the seven in which they were navigable, in 1849. Had it not been for this calamity, they would exhibit a much larger business. As it is, the aggregate is very respectable. We are indebted to the Albany Evening Journal for the following synopsis:—

Statement showing the Total Quantity of each Article which came to the Hudson River, on all the Canals, during the Years 1848 *and* 1849.

THE FOREST.

		1848.	1849.
Fur and Peltry	℔	556,816	554,531
Product of Wood.			
Boards and scantling	ft.	262,279,116	297,431,140
Shingles	M.	104,270	51,258
Timber	cubic ft.	1,510,777	1,497,627
Staves	℔.	114,246,000	154,159,369
Wood	cords,	13,861	11,977
Ashes	bbls.	38,229	25,490

AGRICULTURE.

		1848.	1849.
Product of Animals.			
Pork	bbls.	87,930	73,985
Beef		60,570	105,419
Bacon	℔.	8,182,000	8,577,754
Cheese		43,280,000	42,097,818
Butter		23,730,000	20,880,409
Lard		9,926,000	9,083,062
Wool		8,534,000	12,731,402
Hides		176,000	596,364
Vegetable Food.			
Flour	bbls.	3,131,095	3,263,087
Wheat	bush.	9,116,134	2,734,389
Rye		286,919	322,942
Corn		2,933,963	5,121,270
Barley		1,548,197	1,400,194
Other grain		2,077,724	2,407,895
Ship stuffs		1,437,487	2,022,031
Peas and beans		75,808	160,234
Potatoes		115,629	242,211
Dried fruit	℔.	1,828,000	780,369

All other Agricultural Products.

	1848.	1849.
Cotton.........................lb.	174,400......	316,094
Tobacco.........................	352,000......	1,796,056
Grass seed	1,666,000......	2,479,098
Flax seed.......................	1,764,000......	1,381,684
Hops	1,598,000......	1,877,805

MANUFACTURES.

	1848.	1849.
Domestic spirits ......galls.	1,606,131......	2,107,593
Leather......................lb.	4,540,000......	5,532,610
Furniture......................	1,548,000......	1,116,300
Bar and pig lead..........	86,000......	11,167
Bloom and bar iron.......	11,528,000......	27,906,016
Pig iron........................	29,788,000......	9,636,166
Iron ware.....................	2,314,000......	1,737,690
Domestic woollens.......	1,104,000......	1,055,519
Domestic cottons.........	2,498,010......	2,498,425
Salt.......................bush.	343,618......	283,333

Other Articles.

	1848.	1849.
Stone, lime, &c...........lb.	65,246,000......	45,477,071
Gypsum	3,718,000......	2,551,600
Mineral coal.................	48,292,000......	25,169,939
Sundries......................	97,798,000......	111,810,700

Statement showing the Aggregate, in Tons, under the Divisions specified in the above Table.

	1848.	1849.
The Forest...................tons,	603,272......	664,117
Agriculture.........................	685,896......	769,602
Manufactures.......................	44,867......	44,286
Merchandise........................	6,343......	5,872
Other articles......................	107,527......	96,195
Total ....tons,	1,447,905......	1,580,072

Statement showing the Estimated Value of each Article which came to the Hudson River, on all the Canals, during the Years 1848 *and* 1849.

THE FOREST.

	1848.	1849.
Fur and Peltry..................	$695,838.........	$692,864
Product of Wood.		
Boards and scantling.........	$3,931,277......	$4,459,158
Shingles	338,861......	153,774
Timber	212,598......	119,608
Staves	514,109......	693,702
Wood	69,462......	56,892
Ashes	1,146,870......	479,675

AGRICULTURE.

Product of Animals.

Pork	$967,230	$758,421
Beef	505,700	1,244,360
Bacon	490,997	514,665
Cheese	3,029,169	2,736,212
Butter	3,359,391	2,923,831
Lard	761,757	635,814
Wool	2,303,044	4,072,358
Hides	17,494	59,636

Vegetable Food.

Flour	$17,471,401	$16,315,435
Wheat	3,677,020	2,993,161
Rye	200,310	187,545
Corn	1,834,388	2,970,482
Barley	1,037,293	868,115
Other grain	747,930	868,083
Bran and ship stuffs	172,578	242,755
Peas and beans	75,808	160,234
Potatoes	53,109	117,919
Dried fruit	164,533	78,007

All other Agricultural Products.

Cotton	$11,356	$29,239
Tobacco	43,127	237,007
Clover and grass seed	116,692	148,746
Flax seed	35,268	30,536
Hops	159,095	262,893

MANUFACTURES.

Domestic spirits	$385,871	$526,938
Leather	680,842	885,080
Furniture	153,536	111,630
Bar and pig lead	3,875	508
Bloom and bar iron	172,931	558,120
Pig iron	744,687	96,362
Iron ware	80,993	52,131
Domestic woollens	882,851	895,991
Domestic cottons	622,652	698,816
Salt	106,522	73,666

Other Articles.

Stone, lime, and clay	$92,379	$74,061
Gypsum	8,336	5,742
Mineral coal	108,659	56,633
Sundries	2,001,252	2,241,539

Statement showing the Aggregate Value of the Property which came to the Hudson River, on all the Canals, during the Years 1848 *and* 1849, *under the Divisions as specified in the above Table.*

	1848.	1849.
The Forest	$6,909,015	$8,044,646
Agriculture	37,338,290	38,053,206
Manufactures	3,834,360	3,899,237
Merchandise	593,619	508,048
Other articles	2,210,623	2,280,473
Total	$50,883,907	$51,745,219

Produce Delivered at New Orleans and on the Hudson, and Exported from the United States.

The following table will show the arrivals of produce at New Orleans and on the Hudson, with the exports of the same, from the United States, for the year 1849.

	New York.	New Orleans.	Total.	Total.
Lard	$4,970,113	$635,814	$5,605,927	
Bacon	2,989,385	514,065	3,504,050	$9,245,885
Pork	6,621,911	758,421	7,370,332	
Beef	1,049,437	1,244,360	2,293,797	2,058,358
Cheese	162,867	2,736,212	2,899,079	1,654,157
Butter	131,740	2,923,831	3,055,571	
Flour	4,559,296	16,315,434	20,874,731	11,180,282
Wheat	477,822	2,933,161	3,410,983	1,756,848
Corn	1,953,606	2,970,482	4,924,088	7,966,369
Potatoes	365,290	117,919	483,209	83,313
Indian meal	30,242		30,242	1,169,625
Total	$23,311,709	$31,150,300	$54,462,009	$35,215,117

COMMERCE OF BUFFALO.

LAKE IMPORTS

From the Opening to the Close of Navigation—1849.

BUFFALO, *Jan.* 5, 1850.

The principal articles received here via the lake, during the season of 1849, are as annexed:—

Flour..................bbls.	1,207,435	Wheat ....bush.	4,943,978
Pork ....bbls.	59,954	Corn ....bush.	3,321,651
Beef ....bbls.	61,998	Oats ....bush.	362,285
Seed ....bbls.	21,072	Rye ....bush.	5,253
Eggs......................bbls.	2,806	Barley ....bush.	3,050
Oil ....bbls.	3,840	Lard ....lbs.	5,311,037
Bacon......................lbs.	5,193,996	Tallow.....................lbs.	1,773,650
Lumber ....ft.	33,935,768	Butter......................lbs.	9,714,170
Wool ....bales	49,072	Ashes ....casks	14,580
Meal ....bbls.	6,955	High-wines ....casks	38,753
Fish ....bbls.	5,963	Leather ....rolls	3,870
Tobacco.................hhds.	2,057	Staves ....No.	14,183,602
Hides ....No.	62,910	Cranberries..........bbls.	3,026
Lead........................pigs	14,742	Hemp...................bales	414
Iron ....tons	3,132	Broom Corn.........bales	6,755
Coal ....tons	9,570	Flax......................bales	37
Cotton ....bales	537		

Lake Imports at Buffalo, for a Series of Years.

The principal articles received at this point via the lake, from the opening to the close of navigation, for the past three years, were as follows:—

	1847.	1848.	1849.
Flour..................................bbls.	1,857,000	1,249,000	1,207,465
Pork....................................bbls.	63,750	66,000	59,954
Beef ....bbls.	38,900	53,812	61,998
Seed....................................bbls.	22,536	22,020	21,072
Bacon*...................................lbs.	....	....	5,193,996
Lumber.....................................ft.	17,316,000	21,425,000	33,935,768
Wool ....bales	20,223	40,024	49,072
Fish ....bbls.	3,943	6,620	5,963
Tobacco ....hhds.	1,114	885	2,057
Hides ....No.	64,280	70,750	62,910
Lead ....pigs	16,748	27,953	14,742
Pig iron..................................tons	3,857	4,132	3,132
Coal ....tons	7,716	12,950	9,570
Hemp ....bales	1,062	865	414
Wheat...................................bush.	6,489,100	4,520,117	4,943,978
Corn ....bush.	2,862,300	2,298,100	3,321,651
Oats ....bush.	446,000	560,000	362,285
Rye ....bush.	70,787	17,809	5,253
Lard ....lbs.	3,436,000	5,632,112	5,311,037
Butter ....lbs.	5,079,300	6,873,000	9,714,170
Tallow.....................................lbs.	....	....	1,778,560
Tallow ....bbls.	3,015	4,490	
Ashes....................................casks	7,338	9,940	14,580
High-wines ....casks	18,100	35,700	38,752
Leather ....rolls.	4,960	3,313	3,870
Staves ....No.	8,800,000	8,091,000	14,183,602

* In 1847 and 1848 included in Pork.

(*Buffalo Com. Adv.*)

Statement of Property Cleared and Left at Buffalo, by Canal, during the Season of 1849.

ARTICLES.	FIRST CLEARED. TOTALS. 1849.	1848.	PROPERTY LEFT. 1849.
Furs and peltry ....lbs.	1,138,096	453,970	16,203
Boards and scantling..........ft.	38,543,407	28,747,535	5,475,135
Shingles ....M.	615	2,706	80
Timber ....cubic ft.	12,741	21,661	44,406
Staves ....lbs.	124,254,959	87,477,638	21,500
Wood ....cords	159	52	17,357
Ashes ....bbls.	14,344	13,690	20
Pork..........bbls.	41,643	67,076	308
Beef ....bbls.	59,441	43,190	
Bacon ....lbs.	4,379,058	7,248,347	1,200
Cheese..........lbs.	9,634,685	9,452,984	12,766
Butter ....lbs.	6,590,352	7,036,601	3,401
Lard ....lbs.	4,344,725	6,056,470	
Wool ....lbs.	8,640,409	5,883,856	6,270
Hides ....No.	842,442	420,303	1,758,587
Flour ....bbls.	1,034,938	1,241,870	10,142
Wheat..........bush.	3,940,350	3,973,440	11,781
Rye..........bush.	4,410	2,857	
Corn ....bush.	3,328,463	2,187,562	1,020
Barley ....bush.	859	24,255	45,802
Other grain ....bush.	346,188	288,277	10
Bran and ship stuffs ....bush.	58,280	128	119,726
Peas and beans..........bush.	1,040	4,741	
Potatoes..........bush.	1,022	7,533	5,288
Dried fruit ....lbs.	102,557	205,214	46,407
Cotton ....lbs.	136,015		
Tobacco..........lbs.	1,601,360	254,595	240,139
Clover and grass seed..........bush.	2,510,393	1,546,187	10,177
Flax seed ....bush.	556,188	2,755,107	
Hops ....lbs.	8,035	....	272,145
Domestic spirits..........galls.	1,301,112	1,839,437	2,130
Leather ....lbs.	565,358	486,096	237,052
Furniture	855,130	1,210,890	8,243,936
Bar and pig lead .... lbs.	99,352	94,171	3,173
Pig iron..........lbs.	70,000	129,306	1,098,866
Bloom and bar iron..........lbs.	116,269	81,228	1,123,675
Iron ware ....lbs.	28,591	352,500	5,813,396
Domestic woollens..........	26,621	27,613	400
Domestic cottons	19,938	32,326	38,779
Salt..........bush.	....	....	1,070,155
At 8 mills..........lbs.	311,302	186,563	108,125,784
Sugar..........lbs.	13,030	20,263	12,665,181
Molasses ....galls.	8,680	1,130	11,172,433
Coffee..........lbs.	....	....	5,843,552
Nails and spikes..........lbs.	128,181	122,614	5,605,308
Iron and steel..........lbs.	75,038	44,474	9,198,711
Crockery	81,541	1,900	11,162,716
Oysters and clams..........	600	....	933,018
Stone, lime, and clay	4,411,052	2,594,346	37,582,629
Gypsum	....	....	3,600
Mineral coal..........	2,900,300	6,899,000	13,367,595
Sundries	19,000,864	21,719,261	2,391,791

Tolls in 1849.......................... $757,491.36
Tolls in 1848.......................... 672,619.09

Increase.......................... $84,872.27

TRADE OF TOLEDO.

List of Imports and Exports, and their Value, for the Port of Toledo, 1849.

Articles.	Quantity.	Value.	Articles.	Quantity.	Value.
	Barrels.			*Pounds.*	
Ale and beer	465	$2,035	Grind stones	157,584	$3,152
Beef	2,235	17,800	Gypsum	101,696	509
Flour	142,452	556,675	Glass ware, &c.	359,056	89,762
Fish (fresh water)	2,227	13,362	Hemp	80,230	7,220
Fish (salt water)	747	5,976	Hides and skins	55,502	4,440
Linseed oil	1,878	31,316	Hops	96,224	17,320
Lard oil	2,902	60,128	Hogs' hair	261,074	52,215
Pork	7,614	300,888	Ice	640,000	6,400
Salt	85,005	97,755	Iron	415,865	18,814
Whiskey	16,449	107,508	Iron (cast)	1,063,516	53,176
Domestic spirits	628	4,082	Lard	5,659,241	339,735
Meal	3,888	7,776	Lead	16,675	1,000
	Bushels.		Leather	719,229	107,884
Bran	19,637	981	Machinery	444,374	22,219
Barley	24,272	13,136	Merchandise	1,148,031	5,151,600
Corn	2,052,071	841,349	Marble (unwrought)	941,309	47,065
Coal	4,106	410	Marble (wrought)	117,189	1,171
Potatoes	1,170	292	Molasses	1,291,730	38,752
Oats	18,833	5,649	Nails and spikes	257,626	12,881
Rye	1,088	544	Oil cake	5,404,225	27,021
Clover seed	3,776	11,428	Potters' ware	119,659	2,393
Other grass	2,435	3,052	Paper	188,525	22,623
Flax seed	5,249	4,199	Powder	193,306	77,358
Wheat	715,546	715,546	Pots and pearls	840,297	42,015
			Shot	43,610	2,617
Agricultural imple-	*Pounds.*		Saleratus	48,602	2,916
ments	128,566	64,280	Starch	436	40
Butter	288,640	28,864	Sugar	1,925,092	115,506
Burr blocks	19,929	996	Tallow	469,236	38,539
Extra baggage	814,624	400,000	Tobacco (leaf)	1,877,349	112,641
Bacon and pork in			do. (manufactured)	132,495	19,874
bulk	7,812,887	365,644	Wool	185,033	46,408
Cheese	968,988	50,139	Wooden ware	92,577	11,571
Coffee	1,079,253	86,340	West India fruits	22,242	2,224
Cotton (raw in bales)	221,442	17,715	White lead	29,230	2,046
Cotton yarn	2,425	596	Sundries	447,834	1,791,200
Cordage	29,034	3,629	Animals	2,369	47,380
Copper	48,461	9,692	Empty barrels	415	125
Candles (lard)	218,148	54,537	Brooms	410	41
Cut stone	55,869	280	Lath	617,000	617
Clocks	125,683	87,704	Split and flat hoops	44,000	150
Crockery	353,837	70,668	Staves and heading	113,624	22,724
Dye stuffs	26,040	5,208	Shingles	6,781,250	18,343
Eggs	12,261	370	Wagons	135	6,750
Dried fruit	97,770	58,662	Lumber	3,734,986	37,350
Undried fruit	121,932	1,824	Timber	2,458	245
Feathers	126,945	29,236	Wood	472	708
Furs and peltries	145,047	72,524	Stone	26½	100
Ginseng	70,013	19,612	Mill stones......pairs	14	840
Grease	1,520,900	76,045			

Total Value **$12,690,789**

TRADE OF OSWEGO.

The total value of the foreign and domestic imports at Oswego, for the year 1849, as we learn from an article in the Oswego Times, was $8,100,279. The following table will compare the quantities of some of the leading articles of importations with those of the previous years.

		1848.	1849.
Lumber	feet	34,329,326	51,101,432
Wheat	bushels	3,642,633	3,613,677
Corn	bushels	373,135	383,230
Barley	bushels	181,560	65,256
Rye	bushels	51,565	31,426
Oats	bushels	63,136	133,697
Flour	barrels	89,702	317,758
Beef	barrels	3,751	20,375
Pork	barrels	29,973	31,098
Wool	pounds	198,642	437,761
Butter	pounds	2,712,631	1,960,760
Cheese	pounds	5,281,712	2,601,100
Lard	pounds	4,127,514	4,177,950
Hams	pounds	512,648	2,364,618

The total value of imports from Canada was $2,214,447. The imports of Canadian flour in 1848 were only 50,000 barrels, and of wheat 60,000 bushels; while in 1849 the imports of flour reach 198,623 barrels, and of wheat 632,930 bushels.

Shipments from Toledo to Oswego, during the Season of 1849.

Wheat	bushels	495,020
Corn	bushels	186,690
Pork	barrels	26,227
Bacon	pounds	3,212,320
Lard and grease	pounds	3,091,373
Pot and pearlash	pounds	316,032
Flour	barrels	10,043
Whiskey	barrels	965
Corn meal	barrels	200
Beef	barrels	725
Oil	barrels	193

January 17, 1850.

We take great pleasure in furnishing our readers to-day with the value of the exports and imports of our port, for the season of 1849. By contrasting this with the valuation of last year, which was little more than $8,000,000, it will be perceived that the increase has been rather over 33⅓ per cent. No tables of valuation and quantity have been furnished by any of the other ports, for the past year, that we have seen, and we cannot, therefore, speak with accuracy as to the comparative commercial importance of the several ports; but we hazard nothing in saying, that no port west of Buffalo, adopting the same standard of computation, can furnish so large an amount as ours. Cleveland, as we are informed upon good authority, is less than $12,000,000. Sandusky and Detroit, we know to be very much under those figures.—(*Toledo Blade.*)

BUSINESS OF THE PORT OF ERIE.

The Erie Gazette furnishes the following statement of the Shipments and Receipts at this port, during the year 1849:—

SHIPMENTS.

Wool ....lbs.	1,296,878	Coal ....tons	81,000
Butter ....lbs.	1,176,249	Railroad iron ....tons	552
Lard ....lbs.	28,503	Pig iron ....tons	1,654
Cheese ....lbs.	1,084,610	Pork ....bbls.	904
Leather........................lbs.	33,351	Cider ....bbls.	110
Starch ....lbs.	121,672	Beef ....bbls.	114
Iron, bar, &c. ....lbs.	1,323,183	Ashes ....casks	590
Feathers ....lbs.	1,103	Nails ....kegs	19,650
Glass........................lbs.	141,149	Lumber ....feet	10,242,260
Glass ware........................lbs.	450,414	Shingles ....M.	425
Hemp ....lbs.	12,672	Bark ....cords	1,518
White lead........................lbs.	8,112	Paper........................reams	5,100
Hops ....lbs.	3,565	Sheep pelts..................bbls.	469
Oil cake ....lbs.	9,810	Scythe snaths ....dozens	1,512
Oil cloth........................lbs.	196,712	Rakes........................	961
Corn ....bush.	10,518	Staves	1,512,622
Oats........................bush.	17,848	Gun stocks........................	33,900
Barley........................bush.	5,611	Hoop poles........................	269,300
Seeds ....bush.	684	Oars	18,111
Dried fruit ....bush.	3,863	Chestnuts ....bush.	1,225
Stoves and hollow ware....lbs.	1,858,161	Merchandise & furniture ..lbs.	1,328,183

RECEIPTS.

Merchandise ....lbs.	9,683,712	Wheat........................bush.	13,913
Flour........................bbls.	15,426	Iron ore ....tons	410
Salt........................bush.	26,667	Lehigh coal....................tons	400
Fish ....lbs.	5,983	Plaster........................tons	572
Water lime	120	Limestone ....cords	349
Fire-proof paint ....lbs.	92		

TRADE OF VERMILLION, OHIO.

The following are the Imports and Exports at this port, for the year 1849, as furnished by the Collector:—

IMPORTS.

Articles.	Quantity.	Value.	Articles.	Quantity.	Value.
Merchandise ....tons	237	$80,871	Coal (Lehigh)....tons	153	$1,530
Flour ....barrels	120	540	Shingle wood...cords	40	200
Salt ....barrels	1,986	1,986	Shingles ....M.	272	680
Gravel ....tons	200	200	Lumber ....feet	91	728
Total Value				$86,735	

EXPORTS.

Articles.	Quantity.	Value.	Articles.	Quantity.	Value.
Flour ....barrels	4,553	$20,443	Oats ....bush.	8,144	$2,032
Feathers ....lbs.	310	94	Corn.............bush.	24,456	10,270
Wool ....lbs.	102,726	30,817	Hogshead and pipe staves ....M.	395½	9,597
Cheese ....lbs.	23,494	1,174	Ashes ....casks	272	6,890
Grindstones ......tons	139½	1,106	Wood ....cords	583	656
Dried fruit ......bbls.	910	1,864	Wine.............cask	1	75
Eggs...............bbls.	1	10	Hickory nuts...bush.	50	50
Smoked hams ....lbs.	850	51	Black walnut lumber ....M. ft.	206	398
Lard...........barrels	15	299	Stoves ....tons	64¾	4,532
Lard ....firkins	21	105	Barley ....bush.	903	451
Butter ....firkins	270	2,270	Flag stone......M. ft.	18½	1,113
Timothy seed...bbls.	5	37	White wood lumber "	41	410
Pork ....bbls.	393	3,807			
Wheat.............bush.	23,060	22,811			
Total Value				$121,175	

COMMERCE OF HURON, OHIO.

IMPORTS.

Articles.	Quantity.	Value.
Merchandise ....packages	1,974	$29,640
Merchandise ....tons	250	500,000
Iron ....tons	221	17,500
Nails...kegs	484	2,120
Rice ....barrels	50	250
Oil ....barrels	68	1,360
Glass ....boxes	260	390
Ground lead...kegs	500	875
Crockery ....crates	89	8,900
Hollow ware ....tons	18	1,200
Salt..barrels	2,220	2,670
Sugar ....hogsheads	156	1,233
Stoves..	196	2,940
Furniture ....boxes	30	1,400
Oakum...barrels	40	2,800
Pine lumber (clear)...................................M. feet	5	75
Pine lumber (common).............................M. feet	245	2,450
Shingles ....M.	449	1,610
Shingle wood ....cords	53	371
Cooper wood...cords	14	42
Total Value		$575,165

EXPORTS.

Articles.		Quantity.	Value.
Wheat	bushels	335,589	$302,250
Corn	bushels	138,801	55,552
Oats	bushels	63,728	1,911
Timothy seed	bushels	1,489	1,861
Clover seed	bushels	3,298	11,543
Flax seed	bushels	1,413	1,413
Flour	barrels	6,904	27,616
Pork	barrels	3,360	33,600
Beef	barrels	1,743	13,944
High-wines	barrels	2,672	34,202
Ashes	casks	791	13,853
Lard	barrels	433	6,221
Butter	kegs	618	6,180
Wool	bales	555	20,813
Sheep pelts		560	14,000
Feathers		56	1,730
Leather	rolls	28	840
Broom corn	bales	175	875
Tallow	barrels	151	3,475
Hides		457	1,141
Cheese	casks	29	522
Live hogs		6,319	31,595
Staves	M.	1,931	48,275
Dried apples	bushels	392	382
Dried peaches	bushels	119	297
Walnut lumber	feet	78,968	1,185
Rags	pounds	5,000	75
Eggs	barrels	290	2,900
Furs	boxes	9	900
Total Value			$639,157

STATISTICS OF MICHIGAN.

We are indebted to the Hon. George W. Peck, Secretary of State, for a copy of his Report on the Statistics of Michigan, for 1849, of which the following is a synopsis:—

Comparative Statement of the Number of Sheep and the Quantity of Wool raised in the several Counties in Michigan, as taken from the Census of 1840, *and the Returns of the Assessors for* 1849.

Counties.	Number of Sheep.		Pounds of Wool.	
	1840.	1849.	1840.	1849.
Allegan	107	6,058	239	15,972
Barry	86	6,500	265	14,569
Berrien	2,497	6,889	1.959	16,816
Branch	744	16,557	1,692	38,831
Calhoun	3,957	37,246	3,676	98,005
Cass	5,524	16,335	10,481	43,859
Chippewa	14	....	39	
Clinton	294	4,878	215	13,134
Eaton	103	8,068	104	24,967
Genesee	1,007	18,393	1,302	28,724
Hillsdale	1,804	24,326	3,745	55,382
Ingham	172	9,641	308	24,538
Ionia	270	7,524	345	19,891
Jackson	3,920	45,428	4,225	128,180
Kalamazoo	3,694	31,966	4,362	94,830
Kent	222	6,724	566	16,675
Lapeer	1,197	11,309	1,250	30,318
Lenawee	6,031	52,003	7,429	150,702
Livingston	1,903	25,621	3,945	66,366
Macomb	8,959	27,569	13,057	72,616
Mackinac	6	8		
Monroe	3,010	18,781	3,786	53,053
Oakland	19,656	82,141	33,859	218,536
Ottawa	....	120	....	295
Saginaw	....	752	....	2,050
Shiawassee	375	7,030	584	18,843
St. Clair	1,075	7,575	1,909	20,906
St. Joseph	3,986	20,933	4.298	54,979
Van Buren	528	5,146	900	16,667
Washtenaw	19,273	72,873	29,427	213,485
Wayne	10,181	30,691	19,349	84,567
Total	99,618	610,563	153,375	1,645,756

FLOURING MILLS IN MICHIGAN.

The statistics, taken for the year 1849, give the following results of the Flour Mills in our State. It is to be presumed they are nearly correct.

Counties.	Number of Mills.	Runs of Stone.	Barrels Flour made last year.	Number of hands employ'd	Capital Invested.
Allegan	3	7	2,000	3	$11,100
Barry	1	2	150	2	3,000
Berrien	4	13	12,500	10	29,000
Branch	5	16	18,000	15	52,000
Calhoun	15	44	76,300	37	131,200
Cass	4	9	6,940	3	3,800
Chippewa					
Clinton	2	4	315	4	9,000
Eaton	4	9	3,800	9	8,300
Genesee	10	23	16,591	19	43,600
Hillsdale	6	15	21,500	23	62,000
Ingham	4	6	4,900	9	19,500
Ionia	4	7	2,100	8	16,500
Jackson	13	31	24,100	33	64,500
Kalamazoo	13	29	45,682	34	76,800
Kent	8	13	16,650	11	34,600
Lapeer	8	15	3,500	10	22,000
Lenawee	17	54	54,175	34	162,700
Livingston	11	26	33,875	24	62,500
Mackinac					
Macomb	11	27	31,700	11	46,500
Monroe	6	14	7,300	14	32,600
Oakland	26	65	97,520	65	112,900
Ottawa					
Saginaw	2	2	....	1	900
Shiawassee	3	7	13,500	9	26,000
St. Clair	4	6	1,900	11	24,200
St. Joseph	12	33	51,050	61	131,300
Van Buren	1	3	1,000	2	2,000
Washtenaw	18	57	140,400	100	153,900
Wayne	13	31	34,130	36	157,000
Total	228	568	719,478	598	$1,496,400

Comparative Table, showing certain Statistical Returns made for the State of Michigan, with the Census of 1840, *compared with similar Returns of Assessors, made in* 1849.

	1840.	1849.
Bushels of Wheat raised	2,157,108	4,739,300
Bushels of all other grains	4,666,720	8,179,767
Pounds of Wool	153,375	1,645,756
Pounds of Maple Sugar made	1,329,784	1,774,369
Number of Horses	30,144	52,305
Number of Neat Cattle	185,190	210,268
Number of Swine	235,890	152,541
Number of Sheep	99,618	610,563
Saw Mills	491	730
Flouring and Grist Mills	190	228
Barrels of Flour made	202,860	719,478
Men employed in Saw and Flouring Mills	1,114	2,557

IMPORTS AND EXPORTS—DETROIT CUSTOM HOUSE.

Imports and Exports from the District of Detroit to Canada, from the 1st October to 31st December, 1849.

Imports of goods in American vessels	$40,469.05
Imports of goods in Foreign vessels...............	40,469.05
Exports of foreign goods in American vessels....	658.77
Exports of foreign goods in Foreign vessels......	1,111.79
Exports of domestic produce in American vessels	12,002.00
Exports of domestic produce in Foreign vessels..	33,225.34

Tonnage of—	No.	Tons.	Crew.
American vessels entered coastwise	484	158,266	6,934
Foreign vessels entered coastwise	113	16,495	1,216
American vessels cleared coastwise	497	161,080	7,425
Foreign vessels cleared coastwise	108	14,117	1,099
American vessels cleared foreign countries.	5	238	16
American vessels entered foreign countries	2	180	10

Number of acres of improved land in the State in 1848, 1,437,459½. Number sown with wheat, 465,900½. Average of wheat per acre, 10 $\frac{172}{1000}$ bushels.

Counties.	Acres improved land, 1848.	Acres sown with wheat, 1848.	Bushels per acre.	Bushels harvested in 1849.
Allegan	12,054	2,835	10¾	30,878
Barry	16,375	5,700½	10¾	60,963
Berrien	19,746½	5,611½	7½	41,514½
Branch	46,279	16,455	7½	124,779
Calhoun	96,399	37,036	10	370,478
Cass	59,197	17,960	8¼	147,637
Chippewa	219	none.	......	none.
Clinton	14,733½	5,207	11¾	61,123
Eaton	16,657¼	4,845	12¼	60,027½
Genesee	31,603	18,817½	6¾	126,319½
Hillsdale	56,644	18,798	9	178,643
Ingham	25,631	8,640	9½	82,994
Ionia	23,236	8,302	11½	94,504
Jackson	119,124¾	47,832	11½	540,280
Kalamazoo	64,415	20,065	11	222,839
Kent	25,227½	9,064	10¼	92,533
Lapeer	29,560¾	8,708½	12½	109,962
Lenawee	104,877½	28,281	10½	295,462
Livingston	69,762	26,988	10	268,789
Mackinac	844	none.	......	none.
Macomb	55,450	11,391	15½	175,694
Monroe	41,499	10,728	9¾	98,692
Oakland	170,308	49,812	11¼	557,587
Ottawa	1,230½	271	13½	3,412
Saginaw	1,930	426	13	5,633
Shiawassee	20,824	7,918	10½	84,490
St. Clair	17,394½	1,956	17¾	34,471
St. Joseph	84,255	31,690	8¼	260,616
Van Buren	16,501½	6,034¾	6¾	41,381
Washtenaw	135,689	44,971	10¼	463,615
Wayne	60,254	9,556	10¾	104,033
Total	1,437,459¼	465,900½	....	4,739,299½

The above statistics are exceedingly interesting; and the State of Michigan is entitled to the honor of having carried her statistical inquiries in reference to Wheat culture farther than any other State, if these are to be repeated every year, as they should be. Very few would have believed, without the evidence of the farmers themselves, that there were only four counties in the State which produced thirteen bushels and over per acre; yet the official returns reveal this instructive fact. It is very possible that the harvest of 1849 was less than an average, and the returns of five or ten successive years are necessary to speak with confidence on this subject.

There are several counties in which too much land is in wheat for the highest profit of its cultivators. Thus, Genesee has but 31,603 acres of improved land, of which 18,798 were sown with wheat in the autumn of 1848. These wheat fields gave less than *seven* bushels per acre on an average. One-third of the land ought to yield the same quantity of grain, i. e. 20 or 21 bushels per acre.

It is much to the credit of the farmers of Genesee that they have increased their sheep from 1007 in 1840, to 18,393 in 1849. By reducing the number of acres annually ploughed for wheat one-half, the land so saved would keep 36,000 sheep at four to the acre. Allowing one-half the manure from these to be applied to the 9,000 acres devoted to Wheat culture, it is safe to say that the harvest would be double what the land in Genesee county now yields. This is not a mere *theory* which we are recommending; it is the *practice* of the best wheat-growers in England, who so manage their sheep as to make their manure yield a return of 35 bushels of wheat per acre. This is what we desire to see accomplished, as it can be, in the States of Michigan and Ohio. The writer passed through both of these States on an agricultural tour in September, 1849; and from what he then saw, as well as from an acquaintance of twenty years previous, he has a just estimate of their extraordinary agricultural capabilities.

To show the rapid progress and improvement in wool-growing in Michigan, we ask attention to the following facts: 99,618 sheep in 1840 clipped only 153,375 pounds of wool, being but a fraction over $1\frac{1}{2}$ lbs. a head; while 610,563 sheep in 1849 gave 1,645,756 lbs., being over $2\frac{1}{2}$ lbs. The average gain in wool is over a pound a head.

It will be easy to double the number of sheep in ten years more, and add another pound per head, on an average, to the whole. To give an average of $3\frac{1}{2}$ lbs. of wool a head, taking whole flocks together, the fleeces must weigh 4 lbs. each, as one-sixth of the sheep will be lambs, which will not be shorn.

It is to be hoped that Michigan, as well as all other States, will ascertain how many acres are planted with corn, and the yield per acre. By fixing public attention on these great industrial interests, their improvement will be rapid, sure, and universal; while the cost of collecting agricultural statistics to a limited extent, will be but trifling to each State.

STATISTICS OF IOWA.

We are indebted to the Hon. Joseph T. Fales, Auditor of State, for the following valuable abstract, which contains much useful and reliable information in a condensed form:

AN ABSTRACT FROM THE ASSESSMENT ROLLS

Of the several Counties of the State of Iowa; showing the Value of Property in the year 1849, the increased Value over the Assessment of 1848, with the Amount of Tax levied for State Purposes in the years 1848 and 1849, and the increased per cent. in the Valuation of Property over the year 1848.

No.	Counties.	Census. Populat'n.	Value in 1849.	Increased Val. over 1848.	State Tax in 1848.	State Tax in 1849.	Increase per cent.
1	Allamakee	277	$11,869	$11,869	New Co.	$29 67	all
2	Appanoose	1,281	45,289	16,347	$72 35	113 22	56
3	Benton	312	31,981	8,629	58 38	79 65	37
4	Boone	*150	....	....	New Co.	No return.	
5	Buchanan	406	32,522	10,373	55 47	81 30	46
6	Cedar	3,183	486,523	49,986	1,094 16	1,215 47	11
7	Clayton	*2,500	383,110	98,015	712 73	957 77	37
8	Clinton	*2,044	315,057	84,632	576 06	787 64	35
9	Dallas	635	22,293	7,939	35 88	55 73	35
10	Davis	4,939	353,600	110.526	606 18	882 50	45
11	Delaware	*1,500	143,659	31.305	280 88	359 14	27
12	Desmoines	11,649	2,046,769	219,688	3,654 16	6,140 30	‡68
13	Dubuque	9.185	1,464,781	96,380	3,421 00	3,661 95	7
14	Henry	7,829	881,377	†145,034	2,566 03	2,203 44	†14
15	Iowa	*700	43,884	19,594	60 72	190 71	80
16	Jackson	5,677	666,018	208,726	1,143 23	1,665 04	45
17	Jasper	1,223	96,707	47,733	122 43	247 27	97
18	Jefferson	8,835	865,948	162,244	1,760 75	2,170 96	23
19	Johnson	4,110	662,632	39,222	1,558 52	1,656 58	6
20	Jones	2,140	246,124	12,696	583 57	615 31	5
21	Keokuk	3,953	394,333	102,893	728 60	985 83	35
22	Lee	*16,000	2,353,040	237,896	5,287 86	5,882 60	11
23	Linn	4,762	676,152	167,296	1,272 14	1.690 38	32
24	Louisa	4,155	598,169	5,193	1,482 44	1,495 42	¾
25	Lucas	*200	6.400	6.400	....	16 00	all
26	Madison	701	16.325	16,325	New Co.	40 81	all
27	Mahaska	5,559	485,093	211,670	683 55	1,212 73	77
28	Marion	3,797	275,290	80,386	487 27	688 22	41
29	Monroe	*2,000	148.200	70,080	175 30	370 50	111
30	Muscatine	4,516	933,382	268,059	663 31	2,333 45	40
31	Polk	4,623	163,538	70,437	6,232 75	408 84	75
32	Pottawattamie	6,552	68,911	†21,704	226 54	172 28	†24
33	Poweshiek	443	43,227	31,676	22 08	108 06	400
34	Scott	4,837	699,016	81,556	1,543 65	1,747 54	13
35	Van Buren	11,577	1,297,481	96,299	3,002 95	3,243 70	8
36	Wapello	7,255	882,422	406,864	1,188 95	2,206 05	85
37	Warren	644	27,007	27,007	New Co.	67 51	all
38	Washington	4.431	628,622	62,845	1,414 44	1,571 55	11
	Total	154,093	18,496,151	3,181,786	37,881 33	47,249 42	ag. 24

* Estimated. † Decrease.
‡ In 1848, 2 mills; in 1849, 3 mills.

Auditor's Office, Iowa,
Iowa City, Nov. 28, 1849.

This is to certify that the foregoing is a correct abstract of the assessed value of property within the State, and the Tax on the same for State purposes for the year 1849.

JOS. T. FALES,
Auditor of State.

AUDITOR'S OFFICE, IOWA,
Iowa City, November 30, 1849.

The following list exhibits the several kinds of property, and the value of the same, within the State, as assessed in the year 1849.

JOS. T. FALES,
Auditor of State.

Number of acres of land assessed	3,150,394
Value of land with the improvements	$10,340,624
Value of town lots and improvements	$2,945,299
Value of capital employed in merchandise	$819,637
Value of mills, manufactories, carding machines, &c	$319,211
Number of horses over two years old	34,741
Value of do. do	$1,272,005
Number of neat cattle over two years old	91,222
Value of do. do	$953,513
Number of mules and asses over one year old	231
Value of do. do	$12,609
Number of sheep over six months old	140,787
Value of do. do	$156,168
Number of hogs over six months old	226,861
Value of do. do	$258,189
Number of pleasure carriages	4,756
Value of do. do	$167,200
Number of watches	1,311
Value of do	$45,427
Number of piano-fortes	47
Value of do. do	$6,810
Value of all other personal property over $100	$237,265
Value of stock and profits in companies	$12,293
Value of right or interest in any boat or vessel	$19,194
Value of gold or silver coin or bank notes	$213,782
Value of claim or demand for money or other consideration	$510,577
Value of annuities	$3,918
Value of money invested and secured by deed or mortgage	$108,692
Value of miscellaneous property	$46,774
Total value of all kinds of property	**$18,496,151**
Number of polls	**29,397**

STATISTICS OF OHIO.

We are indebted to M. B. Bateham, Esq., editor of the "Ohio Cultivator," for the following valuable table.

FARM STOCK IN THE STATE OF OHIO.

A Table showing the Number of Horses, Mules, Cattle, Sheep, and Hogs, in each County of the State, according to the Returns of the Assessors in 1849.

Counties.	Horses.	Mules.	Cattle.	Sheep.	Hogs.
Adams	5,955	15	8,433	22,090	29,752
Allen	3,208	......	6,410	11,906	12,566
Ashland	7,360	2	14,292	66,185	24,108
Ashtabula	5,309	81	35,202	61,920	7,309
Athens	4,666	6	11,343	46,021	19,692
Auglaize	2,857	28	6,706	8,567	11,980
Belmont	9,552	5	13,449	71,365	31,323
Brown	7,982	36	10,051	22,990	43,077
Butler	10,632	13	12,420	16,162	63,425
Carroll	5,580	24	10,115	79,753	15,589
Champaigne	7,172	174	12,753	46,870	27,093
Clark	6,765	196	14,031	55,242	25,543
Clermont	8,379	58	10,687	22,195	51,076
Clinton	6,795	221	11,485	49,491	40,538
Columbiana	8,457	7	14,970	124,287	21,234
Coshocton	7,413	8	13,694	59,377	28,353
Crawford	5,118	1	13,488	15,183	20,922
Cuyahoga	6,562	3	19,000	89,921	11,151
Darke	6,340	2	10,803	23,478	29,369
Defiance	1,165	2	3,621	2,115	5,244
Delaware	6,620	29	12,725	47,905	30,573
Erie	3,713	......	8,939	55,361	8,032
Fairfield	10,166	8	16,724	48,105	42,444
Fayette	5,388	436	14,815	42,464	34,125
Franklin	9,466	112	15,007	32,981	5[illegible],516
Gallia	4,402	20	8,293	22,623	17,960
Geauga	4,012	14	21,767	79,518	6,345
Greene	7,870	80	12,530	44,277	36,484
Guernsey	9,282	8	14,182	81,662	30,771
Hamilton	12,419	34	12,239	9,379	37,672
Hancock	4,605	4	9,493	21,300	17,532
Hardin	2,326	7	4,715	7,549	9,982
Harrison	5,952	11	9,892	123,767	19,305
Henry	510	4	1,910	1,087	2,308
Highland	9,027	24	12,024	39,337	53,286
Hocking	3,416	......	7,012	18,523	14,979
Holmes	6,185	14	12,023	51,926	20,979
Huron	6,460	13	17,373	75,951	16,540
Jackson	3,827	21	9,687	22,967	19,607
Jefferson	6,327	3	9,727	105,872	20,233
Knox	8,407	11	14,377	85,883	24,657
Lake	3,201	11	11,140	45,421	4,842
Lawrence	2,608	95	5,757	8,379	14,641
Licking	11,670	31	19,832	118,789	33,891
Logan	6,120	50	10,114	96,136	21,784
Lorain	5,661	20	20,879	91,566	12,725
Lucas	2,623	3	10,093	14,131	8,588
Madison	4,732	176	20,600	48,058	23,587
Mahoning	6,829	17	6,325	115,967	13,751
Marion	4,900	68	11,151	47,523	22,534

Counties.	Horses.	Mules.	Cattle.	Sheep.	Hogs.
Medina	5,681	2	18,292	100,059	13,188
Meigs	3,061	24	7,537	22,717	11,439
Mercer	3,289	1	4,709	5,410	11,009
Miami	7,434	4	10,799	29,024	26,390
Monroe	5,780	19	10,160	28,557	27,607
Montgomery	9,935	19	13,996	29,019	34,243
Morgan	7,853	7	12,397	55,669	26,097
Morrow	6,417	12	12,929	57,667	19,962
Muskingum	11,839	29	19,676	81,785	37,645
Ottowa	798	......	2,866	7,185	4,049
Paulding	339	......	914	421	1,954
Perry	6,411	14	11,018	49,473	20,578
Pickaway	8,181	4	23,889	31,055	54,382
Pike	3,372	6	5,760	12,365	19,911
Portage	5,806	49	26,691	126,577	11,319
Preble	7,965	8	11,167	26,614	38,744
Putnam	1,819	......	4,246	5,548	8,174
Richland	8,800	13	16,811	70,179	26,687
Ross	10,228	82	24,129	30,350	66,488
Sandusky	3,590	2	9,484	24,702	14,017
Scioto	3,809	82	6,595	11,393	17,245
Seneca	7,342	......	15,598	59,318	25,376
Shelby	4,210	45	7,541	16,641	15,241
Stark	9,976	7	19,773	97,769	29,983
Summit	5,740	6	17,169	93,776	15,316
Trumbull	7,072	72	35,968	98,975	12,550
Tuscarawas	7,994	15	15,626	74,581	25,167
Union	4,018	190	8,445	21,809	19,245
Vanwert	937	7	2,649	2,147	5,952
Warren	8,487	4	12,149	28,635	41,717
Washington	6,188	......	16,392	43,752	16,561
Wayne	10,075	9	19,035	84,172	27,375
Williams	1,154	......	5,287	4,597	6,290
Wood	2,016	1	6,584	7,638	7,846
Wyandot	3,227	6	7,649	29,732	12,917

TOTALS.

	Number.	Est. Value.
Horses	506,833	$18,162,269
Mules	2,945	101,233
Cattle	1,058,933	10,483,526
Sheep	3,911,836	2,072,287
Hogs	1,947,672	2,449,820
Total value of domestic animals		$33,269,135

NOTE.—The foregoing table does not include horses and cattle under two years old, mules under one and a half years old, and sheep and hogs under six months old, on the first day of June last.

COMPARATIVE STATEMENTS.

	No. in 1847.	1848.	1849.
Horses	472,392	492,509	506,833
Mules	1,205	2,098	2,945
Cattle	900,162	983,822	1,058,933
Sheep	3,365,025	3,677,171	3,911,836
Hogs	1,757,318	1,879,689	1,947,472

Increase in two Years.

Horses	34,441	or	7½ per cent.
Mules	1,740	"	144 "
Cattle	158,771	"	17½ "
Sheep	546,811	"	10⅛ "
Hogs	190,354	"	10 4-5 "

It will be seen that the rate of increase of cattle is greater than of any other animals. This is owing to the rapid increase of the dairy business in the northern counties, and of the beef cattle trade in the Scioto Valley. It will be seen by the table that the greatest number of cattle are in these two districts—thus:

Dairy Counties.

Trumbull	35,968
Ashtabula	35,202
Portage	26,991
Geauga	21,767
Lorain	20,879
Cuyahoga	19,000

Beef Cattle Counties.

Ross	24,129
Pickaway	23,809
Madison	20,600
Fairfield	16,724
Franklin	15,007
Fayette	14,815

Of sheep, the rate of increase is quite rapid, and the greatest number are found in about a dozen counties in the north and east parts of the State, where the land is best adapted for this purpose—thus:

Mahoning	155,967
Portage	126,577
Columbiana	124,287
Harrison	123,767
Licking	118,789
Jefferson	105,872
Medina	100,059
Trumbull	98,975
Stark	97,769
Summit	93,776
Lorain	91,566
Cuyahoga	89,921
Muskingum	81,785
Guernsey	81,612
Carroll	79,753
Geauga	79,518

By comparison with former tables, we find that the greatest increase of sheep has taken place in Mahoning county, being no less that 58,878, or more than 50 per cent. in two years! and from the *fourth* sheep county in 1847, making it the *first* in 1849; while in cattle she has decreased in as great ratio, though not in as great number or value. Trumbull county, on the other hand, has increased her number of cattle, and decreased in sheep—owing doubtless to the extension of the dairy business in her borders. Similar changes, though not so extensive, may be observed in several other counties.

COMMERCE OF CLEVELAND IN 1849.

The statement prepared by Mr. W. G. Lawrence, deputy collector at this port, shows the commerce of Cleveland to have been as follows:

Imports Coastwise	$5,719,890
Exports do	5,517,514
Imports Foreign	124,979
Exports do	162,202
	$11,524,585

This amount does not comprise all the receipts at this port, as several merchants who receive large quantities of merchandise by steamer, which is not reported at the Custom House, have failed to report.

The total imports and exports for 1848 amounted to $13,886,513.69, which is an excess over those of the present year, of $2,361,928.59. This deficiency is readily accounted for by the shortness of the wheat crop the past season, and the difference in the value of the merchandise imported during the two seasons.

The decrease of wheat and flour exported as compared with 1848, is	$1,213,152.87
And of merchandise imported	2,454,700.00
Making a total decrease of	$3,667,852.87

in articles which depend upon the season or the activity of country business, and over which lake commercial interests can exert little control. The decrease of merchandise is in a great measure to be attributed to the late opening of the canal, which forced a large quantity of goods on the Southern routes.

The Canadian trade has nearly doubled within the past year, and we have the best assurance of a corresponding increase during the coming one. With full crops and general commercial prosperity, the business of 1850 will surpass that of any previous year; and in 1851, with the Cincinnati and Pittsburg Railroads in full operation, the eleven and a half millions of Cleveland business will be swelled to twenty millions at least.

Imports Coastwise from the Port of Cleveland for 1849.

		Quantity.	Value.
Salt	bbls.	120,577	$120,577
Do	sks.	27,800	3,483
Water lime	bbls.	4,308	6,492
Lake fish		13,387	80,322
Molasses		462	6,206
Sugar		1,378	20,670
Do	hhds.	491	29,460
Oil	cks.	178	10,020
Turpentine	bbls.	60	1,080
Cranberries		90	540

		Quantity.	Value.
Tar	bbls.	200	$800
Leather	sides,	5,109	15,634
Do	rls.	454	13,620
Crockery	crates,	67	2,680
Stoves and furniture		1,181	14,172
Bar iron	tns.	626	43,820
Scrap do		220	4,400
Pig do		208	5,824
Railroad do		100	5,000
Copper (masses)		1,000	300,000
Castings		265	6,540
Coal (Lehigh)		515	2,848
Plaster		712	36,120
Marble		1,092	22,550
Foreign liquors	pipes,	64	92,166
Glass	bxs.	596	1,490
Nails	kegs,	1,476	6,642
Burr blocks		1,722	2,153
Oakum	bls.	180	630
Powder	kgs.	465	2,093
Pails	doz.	342	684
Limestone	cds.	609	3,654
Potatoes	bush.	550	272
Axes	bxs.	36	432
Coffee	sks.	845	11,592
Tea	chts.	374	14,960
Lumber	M.ft.	6,808	642,729
Shingles	M.	1,722	3,444
Lath		172	301

Statement of some of the principal Articles that arrived at, and cleared from Cleveland, by way of Canal, during the years 1848 *and* 1849.

Arrived.		1848.	1849.
Barrels	Flour	417,524	376,112
do	Pork	26,111	23,031
do	Whisky	41,135	36,233
do	Linseed oil	1,157	803
Pounds	Pot and pearl ashes	64,384	194,441
do	Pig Iron	7,077,964	6,344,395
do	Butter	2,554,394	2,041,854
do	Bacon	1,820,155	1,145,583
do	Lard	1,636,803	1,723,866
do	Tallow	206,828	263,266
do	Iron and nails	15,674,789	10,434,591
do	Wool	1,407,261	2,008,987
Bushels	Mineral coal	1,925,451	1,910,474
do	Corn	621,454	547,605
do	Oats	165,955	13,107
do	Wheat	1,585,270	851,123

Cleared.	1848.	1849.
Barrels Salt	72,400	74,742
do. Lake fish	9,782	13,225
Pounds Merchandise	13,832,416	13,471,180
do. Castings	1,096,026	958,817
do. Machinery	172,760	55,226
do. Ohio saleratus	471,753	346,645
do. Pot and pearl ashes	268,537	255,342
do. Hides and skins	128,886	226,333
Feet Lumber	4,906,920	7,111,579
Shingles	4,556,250	4,662,256
Hoops	1,840,826	1,244,170

(*Cleveland Herald.*)

OHIO—HER WEALTH AND RESOURCES.

The "Appendix" to the Report of the Auditor of State furnishes the following official information:—

Acres of land	23,768,835
Value of lands	$264,661,957
Value of towns	71,177,354
Value of personal property, moneys, and credits	92,235,476
Total value of taxable property	430,839,885
State tax on property	1,296,547
County, school, and township taxes	1,462,721
Road tax	232,152
School houses and other special taxes	495,436
Total taxes on grand list of 1849	$3,631,878
Number of horses	506,833
Value	$18,162,269
Number of mules	2,945
Value	$101,233
Number of cattle	2,058,933
Value	$10,483,526
Number of sheep	3,911,836
Value	$2,072,287
Number of hogs	1,947,672
Value	$2,449,820
Total value of domestic animals	$33,269,135
Number of pleasure carriages	56,805
Value	$2,523,400
Number of watches	68,516
Value	$850,428
Number of pianos	2,117
Value	$275,203
Value of unenumerated articles	$4,412,163
Merchants' stock	15,407,347
Moneys and credits	31,149,145
Total amount of personal property	92,235,476

Railroad Stocks held by the State.

Mad River and Lake Erie	$393,050
Mansfield and Sandusky	23,333
Little Miami	121,900
Stock dividends on above	71,300
Total amount held by the State	$520,183

Canal Stocks held by the State.

Cincinnati and White Water Canal	$150,000
Pennsylvania and Ohio	420,000
Total	$570,000

The total amount of turnpike, railroad, and canal stocks held by the State is $3,011,858. Dividends on turnpike and canal stock last year, $38,049.

The total amount of capital bank stock, paid in, in all the banks, is $6,488,817, and the amount of tax paid by them to the State, the past year, was $53,862 58.

IRON MANUFACTURES OF CINCINNATI.

The Cincinnati *Chronicle* gives a most gratifying statement of the progress of the Iron manufacturing interest in that city. It says:

The importance of this branch of business is probably equal to, if not greater than, that of any one business in the city. If all the population dependent upon, and incidental to, the manufacture of iron here, in all its several branches, small and great, were collected separately, in one place, it would constitute a town nearly equal to the city of Lowell. This may seem incredible to those who are constantly pointing to cotton manufacturing towns of New England as samples of rapid growth; but, in this city, manufactures are mixed up with the general business of the city, so that it is not until the statistics of some one branch are accurately gathered, that we can see and understand its influence on the city.

As regards the iron works proper, excluding blacksmiths, etc., and including the rolling mills of Covington and Newport, as substantially those of Cincinnati, the following results are reached:—

Number		6
Hands employed		765
Capital invested		$700,000
Products of manufacture		1,230,000
Pig iron consumed	tns.	15,000
Blooms do		5,600
Scrap do		200
Coal consumed	bush.	925,000

Of foundries, engine and machine shops, etc., there are:

Number		26
Hands employed		1,805
Capital invested		$1,448,000
Products of manufactures		2,439,000
Pig iron consumed	tns.	14,340
Blooms do		150
Scrap do		605
Coal consumed	bush.	541,500
Coke do		77,500

In the stove business alone, the manufacture has, within a few years past, risen to half a million of dollars. The summary of iron stove works, in whole or greater part, is:

Number		16
Hands employed		936
Capital invested		$617,000
Product of manufactures		917,000
Pig iron consumed	tns.	10,700
Blooms		
Scrap iron		625
Coal consumed	bush.	65,900
Coke do		117,000

From the above tables the following aggregates are drawn:

Rolling mills, foundries, machine shops, and stove factories	No.	48
Hands employed		3,500
Capital invested		$2,765,000
Products of manufactures		4,636,000
Pig iron consumed	tns.	40,940
Blooms do		5,756
Scrap iron do		2,030
Coal do	bush.	1,532,400
Coke do		194,500

It will be seen by this last table that all these establishments employ a little more than 3500 hands. It is reasonable to suppose that five persons are directly dependent on each of these, and this constitutes, with ample abatement, a population of 16,000 persons connected with the iron works of Cincinnati alone. If to these be added the number of those *indirectly* engaged by these works, it is fair to run up the estimate to 25,000 persons.

The *Chronicle* asserts that this manufacture has increased in a more rapid ratio than the population, and gives the following table, made up from proper statistics, to prove it:

	Increase of people.	Increase of iron works.
From 1836 to '41—increase	325 ℔ cent	400 ℔ cent.
From 1841 to '49—increase	112 ℔ cent	450 ℔ cent.

The iron business of Cincinnati is estimated, at the present time, to be worth five millions of dollars ℔ annum.

COMMERCE OF ST. LOUIS.

Estimated Value of thirty-one of the leading Articles of Produce received at the Port of St. Louis, for the years 1848 *and* 1849, *commencing on the* 1st *of January and ending on the* 31st *of December, with Total Valuation.*

Articles.	1849. Agg. Amount.	1849. Average Rate.	1849. Estimated Value.	1848. Agg. Amount.	1848. Av'ge Rate.	1848. Estimated Value.	Total Valuation.
Tobacco leaf........hhds.	9,879	$50 00 ....⅌ hhd.	$493,950 00	9,044	$45 00	$406,980 00	$900,930 00
Do. manufactured........bxs.	5,904	15 00 ....⅌ box.	88,560 00	5,446	13 20	71,887 00	160,447 00
Hemp........tons.	9,258	110 00 ....⅌ ton.	1,018,380 00	9,454	85 00	802,590 00	1,820,970 00
Lead........tons.	16,428	85 40 ....⅌ ton.	1,402,951 20	24,200	74 00	1,790,800 00	3,193,751 20
Flour........bbls.	306,412	4 20 ....⅌ bbl.	1,286,930 40	387,584	4 25	1,637,232 00	2,924,162 40
Wheat........bush.	1,792,535	80 ....⅌ bush.	1,434,028 00	2,194,789	70	1,526,352 30	2,960,380 30
Corn........bush.	305,333	31 ....⅌ bush.	94,653 23	699,693	28	195,914 04	290,567 27
Oats........bush.	252,291	28 ....⅌ bush.	70,641 58	243,700	21	51,177 00	121,818 58
Barley........bush.	92,463	70 ....⅌ bush.	64,724 10	111,003	38	42,181 14	106,905 24
Rye........bush.	5,844	40 ....⅌ bush.	2,337 60	9,075	35	3,176 25	5,513 85
Beans........bush.	9,078	40 ....⅌ bush.	2,731 20	14,196	40	5,678 40	8,409 60
Beef........tierces.	10,687	9 00 ....⅌ tierce.	96,183 00	9,369	8 50	79,636 50	175,819 50
Do........bbls.	12,336	8 00 ....⅌ bbl.	98,688 00	7,953	6 50	51,411 75	150,099 75
Pork........bbls.	113,862	8 00 ....⅌ bbl.	920,896 00	96,618	7 50	724,635 00	1,645,531 00
Do. bulk........lbs.	9,651,656	2½ ....⅌ lb.	241,291 40	8,454,000	2½	211,250 00	452,541 40
Lard........tierces.	15,801	17 50 ....⅌ tierce.	276,517 50	6,579	17 50	113,132 50	389,650 00
Do........bbls.	58,270	13 00 ....⅌ bbl.	757,510 00	67,329	13 50	908,941 50	1,666,451 50
Do........kegs.	18,845	3 50 ....⅌ keg.	64,957 50	14,180	3 50	49,630 00	114,587 50
Bacon........casks	16,880	30 00 ....⅌ cask.	580,400 00	25,820	28 00	722,960 00	1,303,360 00
Do........bbls. & bxs.	3,245	12 50 ....⅌ box & bbl.	40,562 50	3,775	14 00	52,858 00	93,429 50
Pickled Hams and Shoulders........casks.	10,564	14 56 ....⅌ cask.	153,178 00	7,490	14 00	104,860 00	258,038 00
Whisky........bbls.	29,085	7 50 ....⅌ bbl.	217,997 50	29,758	6 80	201,454 40	419,454 90
Tallow........lbs.	721,460	6¾ ....⅌ lb.	48,698 55	483,920	6½	31,454 80	80,153 35
Butter........lbs.	1,255,280	8½ ....⅌ lb.	106,698 80	1,106,240	9	99,561 60	206,260 40
Bale Rope........coils.	19,065	7 25 ....⅌ coil.	142,211 25	12,633	7 25	91,589 25	233,800 50
Bagging........pieces.	1,079	14 00 ....⅌ piece.	15,106 00	1,084	14 00	15,176 00	30,282 00
Potatoes........bush.	103,500	30 ....⅌ bush.	31,050 00	157,697	30	47,309 10	78,359 10
Onions........bush.	21,350	50 ....⅌ bush.	10,675 00	22,481	35	7,868 35	18,343 35
Grease........lbs.	351,851	3½ ....⅌ lb.	12,314 78	201,350	3½	7,092 25	19,407 03
Hides, dry and green........	68,902	1 80 .... each.	124,033 60	62,097	1 60	99,305 20	233,338 80
Hay........tons.	920	16 00 ....⅌ ton.	14,720 00	845	12 00	10,144 00	24,864 00
Flaxseed........bush.	26,500	85 ....⅌ bush.	22,525 00	32,460	80	25,968 00	48,493 00
Feathers........lbs.	62,340	28 ....⅌ lb.	17,455 20	51,360	20	10,272 00	27,727 20
Brooms........doz.	11,023	1 60 ....⅌ doz.	17,636 80	6,713	1 25	8,391 25	26,028 05
Dried Fruit........bush.	63,102	90 ....⅌ bush.	56,791 80	47,605	85	40,464 25	97,256 05
Green Apples........bbls.	20,583	1 50 ....⅌ bbl.	30,874 50	12,628	1 50	18,792 00	49,666 50
Wool........bales.	1,274	22 50 ....⅌ bale.	28,665 00	904	22 50	20,330 00	48,995 00
Total estimated value........			$10,087,327 99			$10,288,455 83	$20,375,783 82

Difference in favor of the year 1848, $201,127 84.

[St. Louis Republican.]

STATISTICS OF KENTUCKY, FOR 1849 AND 1848.

TAXABLE PROPERTY.	VALUATION. 1849.	VALUATION. 1848.	INCREASE.
	Dollars.	*Dollars.*	*Dollars.*
20,067,352 acres of land......	135,142,565		
19,425,063 do. do.........	....	127,631,871	7,510,694
31,888 town lots................	30,150,406		
29,215 do.	....	29,140,378	1,010,028
2,673 increase in town lots.			
195,110 total slaves............	62,261,571		
192,470 total slaves............	....	60,829,378	1,441,193
2,640 increase of slaves.			
344,478 horses and mares	11,609,095		
353,249 do. do.........	....	11,297,606	311,489
8,771 decrease in horses and mares.			
44,369 mules	1,557,198		
41,081 do.	....	1,533,740	23,458
3,288 increase in mules.			
2,409 jennies	123,626		
2,325 do.	....	114,680	8,946
84 increase in jennies.			
511,894 neat cattle	2,379,117		
495,538 do. do.	....	2,030,621	348,496
16,356 increase in cattle.			
3,474 stores	8,115,787		
3,320 do.	....	7,916,670	199,117
154 increase of stores.			
Value under Equalization Law	33,746,013		
Value under Equalization Law	....	32,361,752	1,384,261
Total..............................	285,085,378	272,847,696	12,237,682
Total amount of taxes	561,382	428,163	133,291

Swine and sheep appear to be exempt from tax in Kentucky. The above figures show an increase of cattle of 16,356 head; and a decrease of horses of 8,771. The latter is quite remarkable. The increase in mules is 3288; and the business of growing this kind of stock is doubtless profitable.

A slight modification of the schedules used in collecting the statistics now obtained, would suffice to learn the acres planted in corn, wheat, hemp, and tobacco, and the yield per acre. Kentucky is admirably adapted, by soil and climate, to sheep husbandry; and if the number annually shorn and the weight of fleeces were given, the knowledge so obtained would aid much in directing public attention to this branch of rural industry. Nor should statistics relating to the dairy be entirely neglected in a commonwealth which possesses so great agricultural capabilities. The owners of the fertile lands of Kentucky and Tennessee do injustice to themselves, in not letting the world know more of the intrinsic productive value of these lands. They abound in the most precious elements of bread and meat, to a vast and unknown depth.

FOREIGN PORTS.

GREAT BRITAIN.

STATISTICS OF COTTON FOR 1848 AND 1849.

Import of Cotton Wool.

From—	Liverpool. 1849.	1848.	London. 1849.	1848.	Bristol & Hull. 1849.	1848.	Scotland. 1849.	1848.	Total Import. 1849.	1848.
United States.....	1,383,027	1,297,985	3,800	2,100	14,900	9,000	76,000	66,300	1,477,727	1,375,385
Brazil & Portugal..	163,768	100,201	......	......	......	......	......	......	163,768	100,201
Mediterranean	71,251	27,810	......	1,200	......	......	1,400	......	72,651	29,010
East Indies	106,967	136,012	46,700	64,700	15,400	6,400	13,100	20,400	182,167	227,512
Demorara, W. I. &c.	7,714	6,089	900	1,500	......	......	500	300	9,114	7,889
Total........pkgs.	1,732,727	1,568,097	51,400	69,500	30,300	15,400	91,000	87,000	1,905,427	1,739,997

Comparison of the Stocks at the Close of the Years 1849 and 1848.

	1849.	1848.
Liverpool	468,100	393,300
London	39,800	57,800
Bristol and Hull	7,000	2,500
Glasgow	44,500	45,000
Total in ports	559,400	498,600
Dealers and spinners	100,000	100,000
Total unconsumed	659,400	598,600

Total unconsumed, 1st January, 1850, 240,325,000 lbs. Average about 364 lbs. ℔ bag.

Total unconsumed, 1st January, 1849, 220,198,000 lbs. Average about 368 lbs. ℔ bag.

Import, Export, and Consumption, for the Year 1849.

Stock in the ports, 1st January, 1849 498,600

Stock in dealers' and spinners' hands—

In England ....93,000 }
In Scotland .... 7,000 } 100,000

Import in 1849..1,905,400

Total..2,504,000

Export to the Continent and Ireland. 152,300 American, 16,800 Brazil and West India, 84,600 East India, 500 Egyptian	254,200
Taken for consumption of England and Scotland, from the ports	1,590,400

Consumed in England, 1,494,100, or 28,694 bags ℔ week.
Consumed in Scotland, 96,300, or 1852 bags ℔ week.

Remaining on hand in the ports, 1st Jan., 1850		559,400
In dealers' and spinners' hands...England	90,000	100,000
In dealers' and spinners' hands...Scotland	10,000	
Total		2,504,000

Import.—The Table of Import into Great Britain, compared with the preceding year, shows an increase of 102,400 American, 63,600 Brazil, 43,600 Egyptian, 1200 West India, and a decrease of 45,300 East India; making a total increase of 165,500 bags.

Consumption.—The average consumption of Great Britain we estimate at 30,546 bags, consisting of 5644 Upland, 18,467 New Orleans and Alabama, and 577 Sea Island—total American, 24,688 bags, 2260 Brazil, 969 Egyptian, &c., 2442 East India, and 187 West India, being an increase upon the consumption of last year of 2400 bags ℔ week; but in packages, at the average consumption of that year, of 2603 bags, or for the whole year, fifty-three millions and a quarter pounds weight.

Stock.—The stock in the kingdom, as compared with the last year, shows an increase of 41,600 American, 29,500 Brazil, 21,700 Egyptian, and a decrease of 31,400 East India, and 600 West India—making a total increase of 60,800 bags. The discrepancy occurring this year between the weekly estimate of stock and the ascertained amount as made up to-day, has probably arisen from a change in the mode of collecting. Previously, it was done by personal application, every Friday morning; lately the return has been made upon a printed form. The most earnest efforts will certainly be made to prevent a recurrence of such a vexatious error.

Weight.—The average weight of the import we calculate at 380 lbs. ℔ bag for Upland, 452 New Orleans and Alabama, 330 Sea Island, 180 Brazil, 210 Egyptian, 376 East India, and 210 West India, &c.—making the total import in lb. weight 754,302,000, being an increase upon the last year of 67,811,000 lb. weight.

GEORGE HOLT & Co., *Cotton Brokers.*

LIVERPOOL, *Dec.* 31, 1849.

LEAF TOBACCO.

Estimated Stocks in Europe on the 31st December, for last Five Years.

	1845.	1846.	1847.	1848.	1849.
London.........................hhds.	27,513	33,374	29,578	28,031	26,547
Liverpool.........................hhds.	16,900	20,500	18,400	16,119	16,355
Bristol, Newcastle, &c......hhds.	1,700	2,000	2,090	2,301	2,645
Scotland ....hhds.	1,300	1,700	2,590	1,740	1,980
Ireland.........................hhds.	1,800	1,600	1,800	1,600	1,600
North of Europe..............hhds.	200	200	200	200	200
Bremen and Hamburg......hhds.	13,600	17,500	12,400	14,500	10,000
Amsterdam, Antwerp, and Rotterdam ....hhds.	26,000	21,700	20,700	15,500	10,800
Spain and Portugal..........hhds.	2,000	2,000	900	200	200
France.........................hhds.	200	200	200	200	200
Total	91,213	100,774	88,858	80,391	70,535

Statement of Receipts at New Orleans, from 1840 *to* 1849.

	Hogsheads.		Hogsheads.
1840	43,253	1845	71,493
1841	53,147	1846	72,896
1842	67,555	1847	55,588
1843	92,509	1848	55,882
1844	82,435	1849	52,335

TRADE OF CUBA.

The following is a comparative statement of the Exports of Sugar from Havana and Matanzas for the last two years; also the Exports of Molasses from Havana, Matanzas, and Cardenas, during the same time:—

SUGAR.

Countries.	From Havana.		From Matanzas.	
	1849.	1848.	1849.	1848.
Great Britain..............................boxes	90,479	102,323	47,286	49,378
Cowes, and market	158,610	108,978	37,686	81,491
Russia	26,562	15,184	30,496	9,630
Sweden and Denmark..........................	7,053	4,475	2,371	1,980
Hamburg	26,238	52,170	8,904	18,714
Bremen..	6,000	10,037	1,897	4,130
Holland	14,945	10,733	637	
Belgium	49,630	46,055	6,494	7,410
Havre and Bordeaux	5,301	15,686	4,559	2,059
Marseilles	23,499	21,263	6,250	1,147
Spain	107,188	126,840	22,148	24,922
Trieste and Italy..................................	16,644	21,774	15,316	13,021
Boston..	8,647	14,497	8,826	22,579
New York..	32,004	73,905	30,783	47,850
Philadelphia	8,894	22,161	6,203	12,170
Baltimore..	2,041	2,414	3,454	2,610
New Orleans	9,417	19,134		
Other U. S. ports..................................	1,662	997	4,998	8,821
British Provinces..................................	152	716	2,242	724
Various..	7,254	15,639	561	2,026
Total..	602,220	684,981	241,106	310,662

MOLASSES.

Destination.	From Havana.		From Matanzas.		From Cardenas.	
	1848.	1849.	1848.	1849.	1848.	1849.
Boston ....hhds.	8,057	11,482	10,019	8,656	26,281	21,904
Other Eastern ports..	7,459	9,726	21,543	17,316	18,690	14,299
N. Y., Phila., & Balt.	5,285	5,489	12,005	13,718	24,536	22,888
Southern ports U. S.	4,435	6,392	3,536	3,888	2,130	2,452
British Provinces......	1,081	2,033	3,700	5,156	863	924
Great Britain	....	1,371	2,143	9,640	1,483	3,267
Other places...........	643	199	265	233	....	23
Total................	26,960	36,692	53,210	58,597	73,983	65,757

EXPORTS FROM CALCUTTA.

We extract from the Boston Atlas the following statement of the Exports from Calcutta to the United States, from the 1st of May to the 30th of November, during the past two years:—

		1849.	1848.
Indigo.....................	maunds......	1,141.........	180
Hides........................	No.......	142,762.........	247,406
Gunny cloth	pieces......	114,239.........	21,300
Gunny bags	No.......	3,230,400.........	2,354,675
Lac dye...................	maunds......	7,183.........	2,743
Linseed....................	maunds......	135,218.........	106,051
Saltpetre	maunds......	135,344.........	94,441
Shellac	maunds......	2,098.........	4,549
Ginger.....................	maunds......	19,326.........	13,595
Silk goods	pieces......	3,124.........	4,652
Goat skins....................	No.......	945,737.........	788,699
Jute..........................	bales......	4,068.........	2,300
Safflower.................	maunds......	73.........	237

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We would express sincere thanks to the gentlemen named below, who have gratuitously furnished essays, reports of the crops, and other valuable information, from which most of the foregoing document has been compiled.

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NOTE.—Several valuable communications intended for this Report have been unavoidably excluded, from the necessity of keeping the volume within moderate limits. Among these are essays and reports from the following gentlemen:—Sidney Weller, N. C.; J. Tagno, N. C.; C. Springer, Ohio; Dr. J. M. Bigelow, Ohio; Lieut. W. D. Porter, U. S. N.

Respectfully submitted,
THOMAS EWBANK.

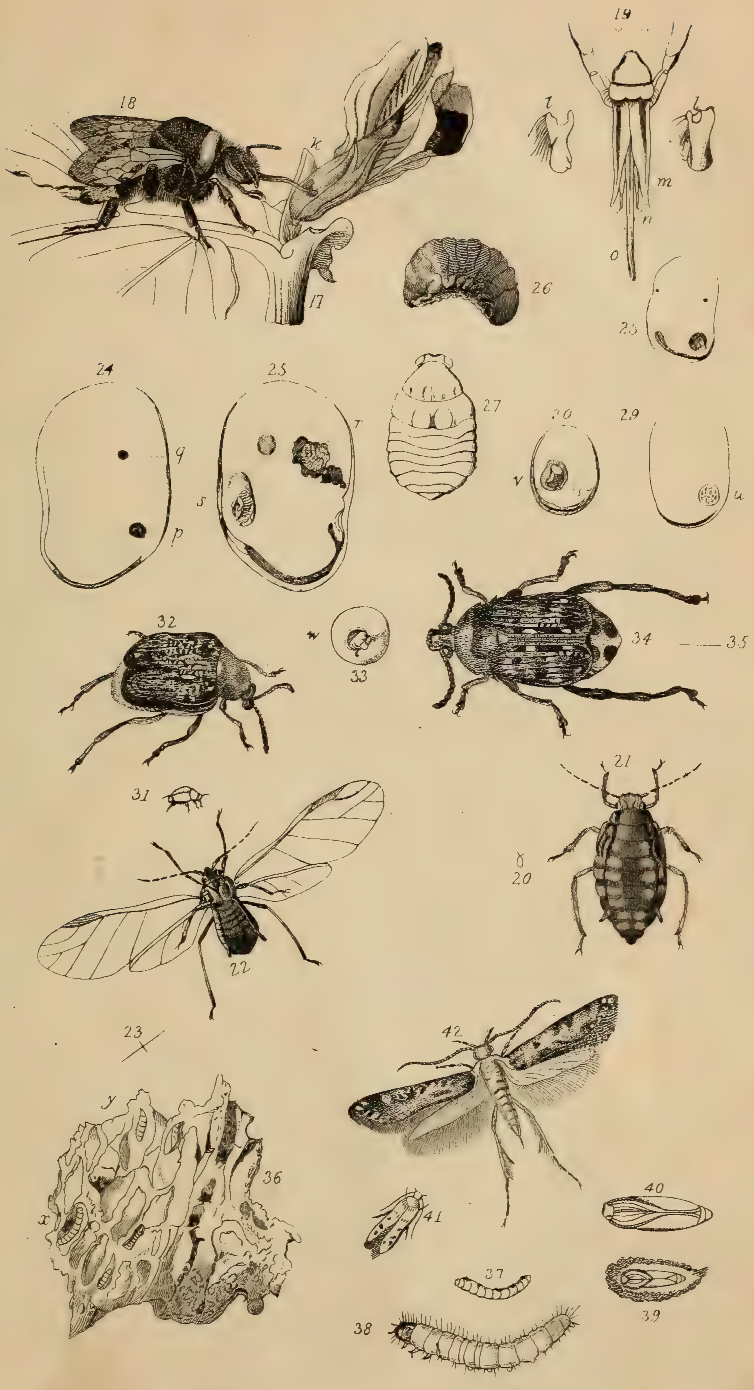
STEREOTYPED BY L. JOHNSON & CO.
PHILADELPHIA.

Plate.1

Eng. by F. Humphreys Steam Lith Press

LEICESTER SHEEP.

Ser. Eng. P. S. Duval's Steam Lith Press.



Sinz. Eng.

P. S. Duval's Steam Lith. Press.

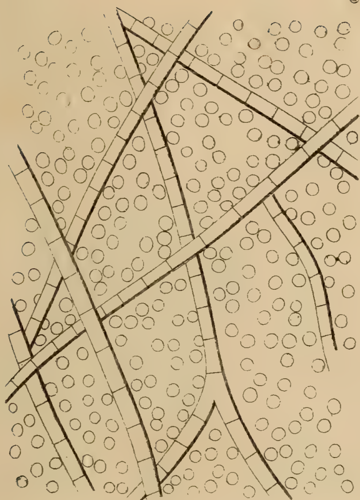


Fig.16 Sporothricum

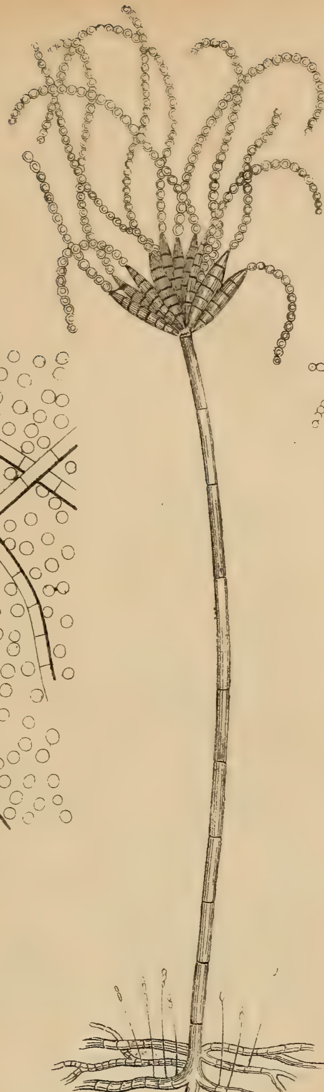


Fig.18 Penicillum

Fig.19 Aspergil

Fig.17 Threads from a Polyporus

Fig.20 Penicillium on Milk

Tilmer & Sons

Fig. 1. The jointed Threads of Common Mouldiness.

Fig. 2. Threads bearing Spores.

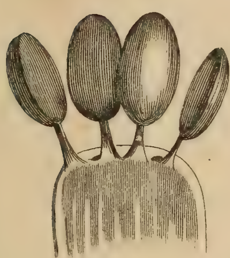


Fig. 3. Showing the attachment of the Spores in fours.

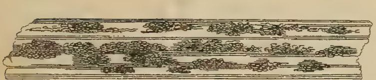


Fig. 4. Common appearance of Mildew.

Fig. 5. Puccinia graminis, or Mildew magnified.

Ilman & Sons

P. S. Duval's Steam lith. press

Plate 6.

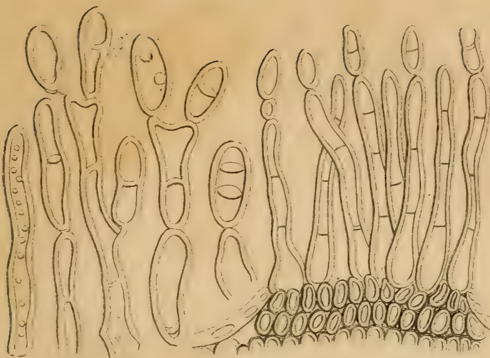


Fig. 6

Cladosporum Herbarum magnified highly

Fig. 7.

Common appearance of Cladosporium on Straw Slightly Magnified.

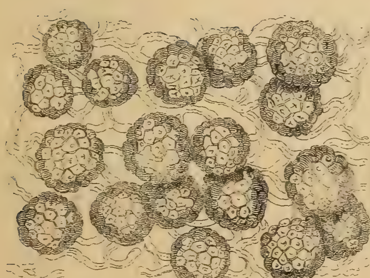


Fig. 9.

Uredo Fetida.

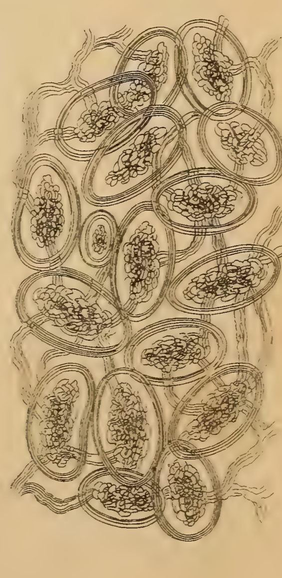


Fig. 8.

Uredo Rubigo.

Fig. 10.

Æcidium of the Berberry.

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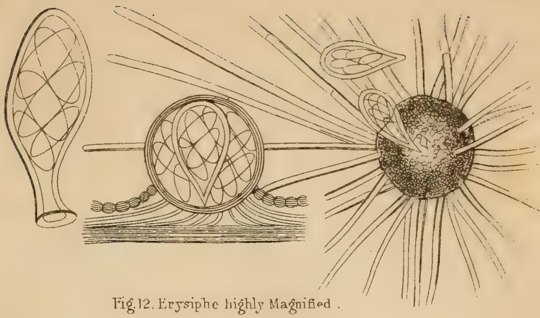
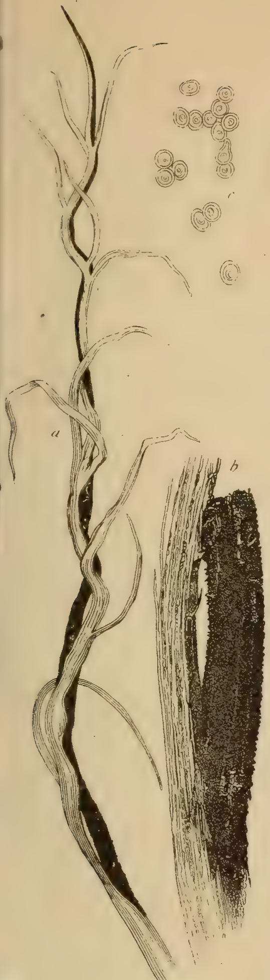


Fig. 12. Erysiphe highly Magnified.



a Represents the stem covered with black spores.
b Shows a portion Magnified.
c Shows the spores under a high power of the Microscope.

Fig. 11. Ustilago Hypodytes.

Fig. 15, Fusarium from the tuber of Potato.

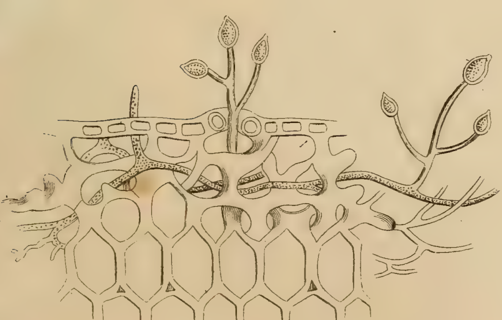


Fig. 14. Botrytis infestans.

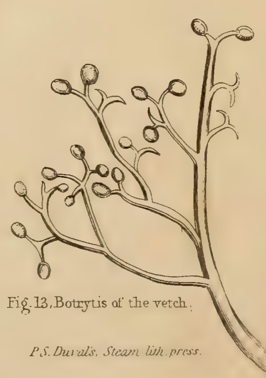


Fig. 13, Botrytis of the vetch.

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P.S. Duval's. Steam lith. press.